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ABSTRACT

This document is a condensation of the report of the Research Task Force of the National Institute of Mental Health. (The comprehensive and detailed report, totaling over 400 pages, is for sale by the Superintendent of Documents.) The purpose of the Task Force was to conduct a comprehensive review and analysis of the institute's scientific activites, and to make substantive and organizational recommendations for future directions. (Author)

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Research in the Service of Mental Health

Summary Report of the Research Task Force of the National Institute of Mental Health

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To:
Bertram S. Brown, M.D.
Director, National Institute of Mental Health

This report provides a detailed summary of the findings and recommendations of the NIMH Research Task Force, established by you in May 1972 to conduct a comprehensive review and analysis of the Institute's scientific activities, and to make substantive and organizational recommendations for their future directions.

For roughly a quarter of a century, the NIMH has been the Nation's major instrument of support for research in the broad domain of mental health. In the Institute's own laboratories and in research facilities throughout the country and the world, thousands of investigators under the auspices of NIMH have been at work on problems that span the entire range of mental health concerns, and that involve the full spectrum of biomedical and behavioral science disciplines. The number of research projects supported annually by the Institute has grown from 38 in 1948, when the first appropriations were made under the National Mental Health Act of 1946, to 1,497 in 1972. More than a billion dollars, approximately one-third of the Institute's total budget to date, has been invested in research.

The yield from this effort has been great. There has been a substantial increase of information about the causes, treatment, and prevention of mental illnesses—and about the factors that help foster mental health. As detailed in this report, scientists in disparate fields have made significant progress toward the solution of a number of mental health problems, and the results of research conducted or supported by NIMH have been widely applied.

At the same time, however, much remains to be achieved. This report makes abundantly clear that many needs are still unmet—among them, for example, more nearly complete knowledge of the causes of major mental illness, better diagnostic and treatment methods, finer and more precise techniques for studying the operations of the brain and their effects on behavior, a clearer understanding of the relation between social and environmental factors and mental health, and more dependable ways both to determine the needs of a given population for mental health services and to measure the impact of such services.

This report provides both an accounting of past achievements and a framework for future efforts. The Research Task Force has fulfilled its mission with a sense of pride over the progress achieved to date and optimism over prospects for further advances in mental health research.

The fact that the Task Force devoted over 2 years to accomplishing its mission reflects both the richness of the Institute's scientific achievements and the depth and thoroughness with which Task Force members approached their responsibilities. A less intensive analysis of the Institute's

research programs could have been accomplished in a shorter period. Its results, however, would hardly have done justice either to the size and scope of the NIMH research investments to date or to the responsibilities with which you charged the Task Force.

The Task Force involved the efforts of more than 300 NIMH personnel and consultants. It should be pointed out, however, that the overall task could not have been completed without the contributions and support of countless other staff members, whose collaboration is embedded in this product.

The report is respectfully submitted in the hope that it will provide an important aid in administering the broad scientific programs of NIMH and a vehicle for creating within the entire mental health community an awareness of the richness, both in problems and in promises, of mental health research. It is addressed through you to all who are concerned with the Nation's mental health, for whatever clarification and guidance it may furnish in advancing our common cause.

Julius Segal

JULIUS SEGAL, Ph.D.
Director
NIMH Research Task Force

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EXPLANATORY NOTE: Recent Reorganization of the National Institute of Mental Health

During the work of the Research Task Force, it became clear that organizational changes affecting the National Institute of Mental Health (NIMH) were impending.

Since neither the timing nor the exact nature of the changes could be foreseen, the Task Force decided to retain its original program descriptions. It was recognized that such descriptions are primarily valuable not because they reflect the details of Federal administration, but because they describe the nature of mental health research, the extent of Federal support, and the results.

Consequently, several organizational units described in this report are no longer part of NIMH. The principal change is that research on alcoholism and drug abuse is now the responsibility of separate institutes. In addition, some administrative offices are now offices of the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA), several with counterparts or near-counterparts in the new NIMH organization. For instance, the Office of Communications has been replaced by an NIMH Division of Scientific and Technical Information, and the Offices of Program Coordination and of Program Planning and Evaluation are now ADAMHA offices.

Within NIMH as of 1974, the Office of the Director is served by the Office of Program Development and Analysis and the Office of Program Support. Divisional organization has remained largely the same, but a new Division of Biometry carries out functions of branches formerly devoted to biometry and epidemiology.

With some exceptions, no attempt has been made to note these changes in this report.

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Research in the Service of Mental Health

A Summary of the Report of the NIMH Research Task Force

This summary is a condensation of the report of the Research Task Force of the National Institute of Mental Health. The report in turn summarizes 12,000 pages of study group reports; it also provides additional information, including a history of NIMH as a research organization and overviews of current research programs. Readers who would like more details than provided here are referred to the base material.

The Task Force: Organization and Process

As noted in the memorandum of transmittal, the Research Task Force of the National Institute of Mental Health was established in 1972 by the Director, NIMH, and charged with analyzing mental health research during the Institute's first quarter-century and with recommending the directions of future research and of organization for research.

In a number of respects, both the organization and procedures followed by the Research Task Force were unique among staff studies designed to assess and plan scientific programs.

An informal Task Force planning group, brought together by the Institute's Deputy Director, included the directors of the intramural and extramural research programs and the president of the Assembly of Scientists, the latter made up of working scientists in the National Institute of Mental Health, the National Institute of Neurological Diseases and Stroke, and the National Eye Institute. This planning group determined that the basic work of the Task Force would be divided among 10 study groups, made up largely of working research scientists. The 10 study groups were as follows:

1. Biological and Physiological Processes
2. Psychological Processes
3. Social and Cultural Processes
4. Mental Illness and Behavior Disorders
5. Drug Abuse
6. Alcoholism
7. Social Problems
8. Treatment Techniques

9. Mental Health Services
10. Research Information and Utilization

The planning group nominated core members for the 10 study groups, largely from Institute personnel, and these members were invited by the Director, NIMH, to participate. The study groups were given virtual autonomy; they chose their own chairpersons, enlarged their original membership as they wished, and set about their task in whatever ways they saw fit. The mission of each study group reflected goals of the Research Task Force as a whole. These were to:

1. Describe ongoing and past NIMH research activities and objectives, and related efforts in the field.
2. Evaluate the outcome of these activities.
3. Recommend emphases and deemphases for future research activities.
4. Recommend methods for managing the implementation of new initiatives and the continuation of ongoing programs.
5. Recommend changes in NIMH internal organizational structure, if necessary.

The study groups approached their work in ways that differed mainly in details and in sequence of steps. All the groups solicited the knowledge and opinions of other scientists and research administrators, both inside and outside the Institute. The groups also studied written information available within the Institute in the form of published and unpublished reports on activities and accomplishments in a given area and of summaries of individual research projects. For a view of current research, the groups: (a) examined summaries of all the research projects in their areas that had been funded in 1972 as part of the Institute's extramural research program, and (b) considered the research being done within the Institute itself. All the groups used the expertise of their members, coupled in many cases with that of consultants, to sort out and pass judgment on the rich store of information brought to the surface.

Nearly 300 people were involved in Task Force activities. The 10 study groups comprised 88 men and women who gave varying proportions of their working time to the project. Of the group members, 61 were NIMH employees, 22 came from outside of Government, and 5 were from Government agencies other than NIMH. More than 200 consultants assisted the groups in various ways, such as reviewing a research area, answering critical questions about an area, or reviewing and analyzing preliminary reports. A Task Force staff, numbering about 15 at any one time, supported and managed the entire enterprise.

General supervision of the overall task was provided by a Coordinating Committee, convened by the Deputy Director, NIMH, and chaired by him and by the Task Force Director. The membership of this Committee included the directors of the operating divisions, the 10 study group chairpersons, selected Task Force staff members, and an NIMH representative of the Assembly of Scientists.

The overall Task Force report was based largely on the individual study group reports. It was prepared by selected members of the Task Force staff and Coordinating Committee, acting for the Coordinating Committee as a whole.

The report has been reviewed by the Coordinating Committee and by a number of eminent scientists, research administrators, and others from outside NIMH, all of them active in the mental health or allied fields. It is addressed to the Director, NIMH, and by extension to all others who are concerned with improving the Nation's mental health.

Scope of the Nation's Mental Health Problems

As noted in the full report, fully reliable statistics describing the incidence and prevalence of mental and emotional disorders do not exist. Nevertheless, overall estimates, even if erring on the high side by a generous margin, indicate that no less than 10 percent of the United States' population, or roughly 20 million people, suffer from some form of mental illness. About one-seventh of those afflicted actually receive psychiatric care of some sort.

Based upon those figures, and taking into account such factors as the mentally ill individual's loss of earnings and the cost of care both in and out of institutions, the annual cost of mental illness in this country is estimated at about $21 billion, or almost one-quarter of the national defense budget. This estimate may well be low; other estimates put the economic cost of alcoholism alone at $15 billion annually, and the annual cost of drug abuse at $10 billion.

Recent data indicate the relative distribution of major categories of mental health problems in terms of patient admissions. In 1971 the admissions to all psychiatric inpatient and outpatient services were at the rate of 1,239.6 per 100,000 people. This total was distributed among the following diagnostic categories:

Schizophrenia	258.0
Depressive disorders	216.9
Alcoholism	127.9
Organic brain syndromes	54.9
Drug abuse	43.1
Mental retardation	28.9
Other psychotic disorders	18.9
Undiagnosed	88.9
All other diagnoses, including, for example, child behavior disorders, neuroses, and psychosomatic disorders	401.1

These data, while indicative, scarcely begin to convey the suffering, economic loss, and social consequences of mental illness and behavior disorders. Steps to be taken to measure more accurately the scope of the individual mental health problems faced by the Nation are presented in the full report. Such data are needed to fully assess the impact of specific interventions. They are hardly required, however, to conclude that the research mission of NIMH carries with it the obligation and the prospect of reducing what may safely be regarded as America's primary public health problem.

Background of NIMH as a Research Organization

The Mission

The National Mental Health Act of 1946 authorized the establishment of NIMH with this statement of mission from Section 2:

> *The purpose of this Act is the improvement of the mental health of the people of the United States through the conducting of researches, investigations, experiments, and demonstrations relating to the cause, diagnosis, and treatment of psychiatric disorders; assisting and fostering such research activities by public and private agencies and promoting the coordination of all such researches and activities and the useful application of their results; training personnel in matters relating to mental health; and developing, and assisting States in the use of, the most effective methods of prevention, diagnosis, and treatment of psychiatric disorders.*

The Act also provided for a National Advisory Mental Health Council to recommend support for research that might make "valuable contributions to human knowledge with respect to the cause, prevention, or methods of diagnosis and treatment of psychiatric disorders." Subsequent legislation added a number of specific social problems with which NIMH should be concerned.

Though the program was authorized in 1946, funds were not made available until FY 1948. It was on April 1, 1949, that the Public Health Service Division of Mental Hygiene officially became the National Institute of Mental Health.

Extramural and Intramural Programs

From the beginning, the Institute has supported research through both extramural and intramural programs, with the bulk of its funds going to the Extramural Research Program (ERP).

Under the extramural program, scientists throughout the country submit applications for grants to support particular research projects; the applications are reviewed by initial review groups, comprised of scientists from outside NIMH who have been chosen for their competence in a given field; and recommendations for approval or disapproval are made to Institute staff, solely on the basis of the scientific excellence of the proposals.

Before a research grant application can be funded, it must also be recommended for approval by the National Advisory Mental Health Council. The actual funding of a recommended project is decided by program managers, who consider the findings of the review panel, program priorities, and the availability of funds.

For the most part, the grants program does not shape mental health research except by making money available for research. That is, NIMH staff do not point to a specific problem and ask research scientists to bend their minds to it. Instead, the program funds those grant applications that have arisen spontaneously from the field of science and have successfully passed through the peer review system just described. In other words, Institute policy for its extramural program has been to support the scientifi-

cally best projects, relevant to mental health, for which there are funds available.

The Intramural Research Program (IRP) has been conducted largely in laboratories and the Clinical Center of the National Institutes of Health. Here it has been Institute policy to support a multidisciplinary program whose directions have been determined by the best scientists the Institute could recruit—and its recruitment efforts through the years have been highly successful. The program has always emphasized basic and clinical research. Intramural projects are reviewed by laboratory and section chiefs for scientific merit and relevance to a unit's activities; overall intramural programs are reviewed by a Board of Scientific Counselors.

As an indication of the Institute's growth in size and complexity, most research grants during the early years were channeled through a single Institute branch, which was advised by one review committee; in 1972, however, NIMH had 22 funding units and 17 review groups. Similarly, intramural research programs began with the transfer to NIMH of the Addiction Research Center; in 1972 they embraced more than 300 projects carried out by six divisions.

Growth of Research Support

Expenditures for mental health research rose from $.8 million in FY 1949 to about $7.8 million in FY 1956. The following year, Congress added an additional $5 million, ushering in a period of rapid expansion in mental health research. By the end of that period, in 1964, the research budget had passed $80 million.

During the expansion period, NIMH greatly increased its support of research on better methods of treating and rehabilitating people with mental disorders and on juvenile delinquency and drug addiction. It also established the Psychopharmacology Research Branch, the National Clearinghouse for Mental Health Information, and an International Research Program. (NIMH has spent $8 million in research funds in foreign countries. More than half of this has gone for work in Canada and the United Kingdom; much of the rest, for research in France, Switzerland, and Norway. In addition, about $2.5 million in U.S.-owned foreign currency funds was spent for research or research-related activities in Poland, Yugoslavia, and Israel between 1962 and 1972.)

In the mid-1960's the Community Mental Health Centers Act gave NIMH a vast responsibility for services as well as research—a mandate that was not given to the other Institutes in the National Institutes of Health.

Organizational Changes

Since 1964, there have been numerous changes both within the Institute and in the Institute's position as a Federal health agency. A major internal change was the creation of special units or centers to coordinate research, training, demonstration, consultation, and communication efforts in nine special areas. Among them were alcoholism, drug abuse, crime and delinquency, the mental health of children and youth, schizophrenia, metropolitan problems, and minority group mental health programs. Cer-

tain centers could directly support research and other projects; others were limited to coordinating activities.

Because of great public interest in alcoholism and drug abuse, Congress rapidly allocated more funds for work on these problems. Consequently, the centers dealing with them became NIMH divisions, and ultimately, institutes themselves.

The following changes have been made in the Institute's position:

- On January 1, 1967, NIMH was formally moved from the National Institutes of Health and given independent bureau status (equivalent to that held by NIH) within the Public Health Service.
- In 1968 it lost this status because of its still growing responsibility for service programs in alcoholism and drug addiction as well as in general mental health, and was placed in the new Health Services and Mental Health Administration (HSMHA).
- In July 1973, following the breakup of HSMHA, the Institute was transferred back to NIH.
- In September 1973, the Institute was designated as the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA). The new organization included the National Institute on Alcohol Abuse and Alcoholism, which most recently had been an institute within NIMH; the National Institute on Drug Abuse, which had been an NIMH division; and the National Institute of Mental Health. On May 14, 1974, ADAMHA was given statutory authority in legislation enacted by the Congress and signed into law.

Funding in Recent Years

Between 1968 and 1972, money for research grants increased by about $17 million—most of it for research on alcoholism and drug abuse. Excluding those two categories, the total for general mental health research grants was $63 million in FY 1972. The amended FY 1973 budget included $56 million for such grants; the FY 1974 budget, $60 million. Coupled with the inflation, the decreases point to a considerable lessening of the Institute's ability to support mental health research.

The number of grants for general mental health research stood at 1,366 in FY 1968 and at 1,209 in FY 1972.

This same period, 1968–1972, was one of increasing constraints for the intramural program as well. It lost nearly 15 percent of its budgeted personnel positions.

Training for Mental Health Research

The Institute has supported a variety of efforts to increase the number and proficiency of scientists engaged in mental health research.

The Research Fellowships Program, which began in 1948 with the Institute's founding, has awarded fellowships running from 1 to 3 years to students and scientists at three levels—predoctoral, postdoctoral, and special, meaning for the experienced investigator. Most of the individuals supported—an estimated 6,600 through FY 1972—have been students at the first level.

The Research Development Program, which began as the Career Investigator Grant Program in 1954, has aimed at providing stable support

for outstanding, young investigators who otherwise would have difficulty following careers in mental health research. About 325 investigators have been thus aided.

The Training Grants Program began in 1957, the year of Sputnik. Under it, grants have been awarded to public and private nonprofit institutions to provide financial aid to behavioral science students preparing for either service or research in mental health fields. An estimated 7,690 individuals have been aided.

Research training expenditures through FY 1972 totaled about $210 million. About 29 percent of this went to the Fellowships Program; 18 percent to the Research Development Program; and 53 percent to the Training Grants Program.

Under the Administration's decision in 1973 to end Federal support of research training programs, the Institute began phasing out the first and third of the programs listed. The Research Development Program, though, was recognized as a research program.

The NIMH Research Programs Today

The Institute's research program is and always has been heterogenous. It ranges from studies of the individual cell to studies of the social structure. It includes research on malfunctioning of the brain, child development, the sick family, voluntary control of cardiovascular functions, drugs for mental disorders, the nature of racial prejudice, and hundreds of other subjects relevant to a better understanding of the origins, prevention, and treatment of mental illness.

In FY 1972, approximately 1,500 research projects across the country, including those on alcoholism and drug abuse, were supported by the Institute's extramural research program at a cost of $82.4 million.

In the same year, more than 300 intramural projects were supported at a cost of $19.7 million, and the Institute made 110 research-related contracts totaling $10.1 million.

The total research expenditures in FY 1972 amounted to $112 million, which was spent as shown in the following table:

TOTAL NIMH RESEARCH FY 1972

Problem Area	% of Research Funds
Causes & Prevention (divided about equally between basic and problem-oriented research)	62
Amelioration	19
Diagnosis and Epidemiology	9
Services Delivery	8
Dissemination and Use of Findings	2

In grant-financed research, which accounted for almost three-fourths of the total, expenditures were apportioned approximately the same way as the total expenditures.

In contract-financed research, expenditures for research on diagnosis, delivery of services, and dissemination and use of findings were proportionately very much higher than in the total.

In intramural research, about 80 percent of the funds went for studies concerned primarily with increasing our understanding of the processes

underlying human behavior; almost all of the rest supported research on amelioration. About 70 percent of the research on basic processes was concerned with biological processes; about 25 percent, with psychological processes; and 5 percent, with sociocultural processes.

About 70 percent of the funds for extramural research grants in FY 1972 went to the research units of colleges and universities, and most of the rest to hospitals, clinics, and independent research organizations.

Psychologists received 45 percent of the research grant funds; psychiatrists, 18 percent; other medical scientists, 13 percent; social scientists, 11 percent; biologists, 6 percent.

Chapter 3 of the report uses a number of additional factors to describe the distribution of the Institute's research funds. That chapter also presents the best available information on how this program relates to the mental health research efforts of other Federal agencies. The inadequacies of existing data make it impossible to develop a valid comparison of the efforts of NIMH and those of other national organizations in research relevant to mental health.

Biological Influences on Behavior

More has been learned about the brain in the last quarter-century than in all previous history. Research on brain and behavior has evolved into distinct disciplines such as behavioral genetics, brain development, neurophysiology, neurochemistry, neuropsychology, neuroendocrinology, and neuropharmacology. Thanks to this research—a significant part of it undertaken or supported by NIMH—we now have a substantial understanding of some of the biological processes involved in two major forms of mental illness and are tantalizingly close to further discoveries.

From the standpoint of the rapidity with which basic discoveries can be clinically applied, two advances since the founding of NIMH are particularly significant. One is the discovery that information is transmitted through the brain and the rest of the nervous system by the release at nerve cell terminals of biochemicals called neurotransmitters; these bridge the gap between cells. The second is the amassing of evidence that heredity plays an important role in abnormal—as well as in normal—behavior.

Neurotransmitters: Keys to Causes and Treatment

The discovery of the chemical action at the synaptic cleft between neurons and the identification of several compounds responsible for neurotransmission in at least some parts of the brain grow from the research of hundreds of scientists, representing a number of disciplines, working over long periods. They grow, too, from the development of radioactive tracer, histochemical fluorescent, and other sophisticated techniques for detecting the presence of a given chemical at a given point in the brain.

One of the neurotransmitters, norepinephrine, is now considered important or even crucial in regions of the brain believed to govern the emotions. Within the last few years, one experiment after another has demonstrated that treatment for a major group of mental illnesses—the depressive or affective disorders—has a striking effect upon norepinephrine. Seemingly disparate modes of therapy work in one way or another to increase the supply of norepinephrine at transmission points. This find-

ing is obviously important both to understanding the depressive disorders and to treating them.

The findings of basic biological research have been similarly used by clinical investigators at NIMH and elsewhere to study the mechanisms by which psychotropic drugs act against another major group of mental illnesses, the schizophrenias. Here, too, a key role goes to a brain chemical that has frequently been identified as a neurotransmitter. This one is dopamine, the precursor of norepinephrine—that is, the substance from which it is constructed.

Research on Parkinsonism helped clarify the role of dopamine in schizophrenia. Physicians noticed that schizophrenics treated with large doses of chlorpromazine or other tranquilizing drugs of the phenothiazine family often developed tremors resembling the symptoms of Parkinsonism. The brains of Parkinsonism patients, in a region that regulates body movements, were found to contain abnormally low levels of dopamine. Treatment of Parkinsonism with L–dopa, which is the precursor of dopamine, often produced great improvement. Further studies of how the phenothiazines affected the brain produced strong evidence that these drugs were lowering the level of dopamine at the synapses. In sum, it now appears that L–dopa treats Parkinsonism by raising the level of dopamine and that drugs for schizophrenia work by lowering it, or by otherwise blocking the dopamine effect.

Heredity: Evidence of Its Role in Mental Illness

Two lines of research, much of it conducted or supported by NIMH, have demonstrated that heredity strongly influences susceptibility to schizophrenia. In one approach, investigators in the United States and Europe have studied pairs of twins in whom only one twin became schizophrenic. If the twins were identical, they found, the probability that the other twin would become schizophrenic ranged from 25 to 40 percent. The other approach has been concerned with schizophrenic children and their biological and adoptive parents. The adoptive parents of children who later became schizophrenic had no higher incidence of the disorder than the adoptive parents of normal children. But the biological parents of children who later became schizophrenic (although living with normal, adoptive parents) did have a high rate of schizophrenia themselves.

Since the concordance rate for schizophrenia in identical twins is less than 50 percent, the genetic factor by itself does not bring on the illness. The question is what triggers the breakdown in the twin who becomes schizophrenic. An Institute study suggests that the schizophrenic twin is smaller and weaker at birth, or becomes so through an early illness, and thus is made the object of worry and attention. The world appears more threatening to this twin, and its stresses become overwhelming as he approaches adulthood. A study of the children of schizophrenic mothers, from birth on, has shown a clear relationship between the development of schizophrenia and the kind of pregnancy and birth difficulties that might have caused damage to the child's central nervous system. Where there is a predisposition to schizophrenia, such damage—perhaps allied with parental concern—may sooner or later lead to a breakdown.

Behavioral geneticists, neurophysiologists, neurochemists, and other scientists are adding to our knowledge of the role of heredity in depressive

disorders as well. In the case of manic-depressive psychosis, the incidence in the general population has been estimated at 0.7 percent. Among identical twins, however, the concordance rate runs from 50 to 100 percent.

Genes work by altering enzymes or other proteins. Just what occurs when a person inherits a susceptibility to psychotic behavior remains to be learned. But in the case of certain types of mental retardation, researchers have uncovered the nature of the inherited biochemical defect. In phenylketonuria (PKU), for example, retardation stems from the body's inability to convert the amino acid phenylalanine to tyrosine, and this inability results from the lack of a single enzyme, whose production is controlled by a single gene. NIMH scientists have made major contributions to this research. About 85 other genetic diseases of metabolism, each with an enzymatic defect, have been identified.

Research has found, too, that genetically governed conditions may be far from incurable. Knowledge about inherited susceptibility, much of which is being gained through animal research, can lead to precise forms of intervention and to prevention or treatment.

New Findings on the Brain's Development and Functioning

Basic to further understanding of biological influences on behavior is research on the physiology and chemistry of brain cells and on the development of the brain from conception on. In both of these areas, great progress has been made.

Since the Institute's founding, for example, research has shown that the brain's 10 billion neurons are specialized by location, shape, and metabolism, by the population of other nerve cells with which they can directly communicate, and by the neurotransmitters they can manufacture and secrete. Each cell's membrane, it has been discovered, has "recognition sites" to which the axons of specific neurons are drawn. (Axons are the long nerve fibers that carry a neuron's electrical impulse to the synaptic cleft linking it to another neuron.) Each neuron also has receptors for specific hormones and neurotransmitters.

Investigators have shown increasing interest in both cell membranes and cell receptors. Their research should delineate more clearly the functioning of the brain's intricate communication system and perhaps lead to a fuller understanding of how abnormalities in this system generate abnormalities in behavior.

Other research over the last 25 years has demonstrated that the embryonic and developing brain is exceptionally vulnerable to environmental influence. Malnutrition during the prenatal and neonatal periods, when cell division is at its peak, permanently reduces the number of neurons in the brains of mice. Reductions in the number of cells are accompanied both by biochemical changes, including the activity of enzymes and neurotransmitters, and by changes in behavior. The animals show apathy, undue alarm, and impaired learning. The research indicated that the earlier the malnutrition occurred and the longer it lasted, the greater the deficits.

Very young organisms—animal or human—are affected by the lack of sensory experience as well as of nutrition. In rats, extreme sensory deprivation has been found to stunt brain development. On the other hand,

enrichment of the environment so that brain as well as body can be exercised leads in young rats both to a larger cortex and to an increased problem-solving ability.

Evidence has accumulated, too, that early interaction between hormones and neurons somehow determines how the brain develops in order to produce behavior characteristic of the adult. For example, male guinea pigs that have lacked exposure to the male hormone behave like females.

Investigators at the Institute and elsewhere have uncovered a remarkable capacity of the developing brain to recover function after an injury. In the adult animal, loss of a certain part of the cortex results in the loss of the functions controlled by that part. But in the immature animal, the functions are spared to varying degrees. Brain scientists have discovered that when axons are damaged, remaining normal axons sprout collaterals which appear to occupy the sites formerly occupied by the injured axons. If these new synaptic junctions are functional, as suggested by recent studies with laboratory animals, an important though very preliminary step toward understanding recovery of function following brain injury will have been taken. There is now laboratory evidence, too, that in the mammalian brain and spinal cord, some neurons themselves can be regenerated. However, certain conditions, such as the formation of scar tissue, prevent the regenerated cell from making contact with other cells. The problem now is to learn if and how these factors can be overcome. The work may deeply influence the treatment of spinal injury.

Biological Bases of Memory and Learning

Twenty-five years ago, scientists were skeptical that memory, learning, and other higher functions could be shown to be related to particular brain processes, but in the intervening years there has been considerable progress toward doing so. The findings of one line of research suggest that, here again, the neurotransmitters may have a vital role, for the concentration of brain neurotransmitters is higher in animals that have learned a certain response than those that have not. Other research has found that compounds known to interfere with the synthesis of protein interfere also with the process of memory. Possibly these compounds disrupt the synthesis of a "memory protein," though it is not yet clear whether the disruption is in the storage of information or in its retrieval.

Progress has been made, too, in determining the sites of learning and memory processes. Some of these appear to be in the part of the brain known as the hippocampus, where changes in electrical activity, in animals, have been found to reflect the process of learning a habit. Disruption of the hippocampus, by electrical or other means, also disrupts what has been learned. Other parts of the temporal lobe have been implicated in visual learning and visual memory. Among many additional advances in this field, the cortex of the frontal lobes—once considered to be simply the repository of general memories—can now be divided into several parts, each with its own function. Such work will undoubtedly have importance for the refined clinical diagnosis of brain injury from such causes as strokes and accidents.

From the clinical point of view, our increased understanding of the type of learning known as operant conditioning and its clinical application

under the name of behavior therapy ranks at the top of recent decades of development in psychology. Moreover, such techniques as electrical and chemical stimulation of the brain have aided in locating at least some of the brain systems responsible for the effect of reinforcement or reward, which has a critical role in this type of learning. Once again norepinephrine is involved. Serotonin, another putative neurotransmitter, seems to be involved in controlling the effects of punishment, rather than reward.

Studies of other brain systems have vastly expanded our knowledge of the biological structures responsible for motivated behavior, for sleep and pain, for attention and perception, for the performance of motor skills, and for sexual, aggressive, and other social behavior. Abnormalities in the functioning of any of these structures may lead to behavioral abnormalities, including perhaps a mental illness.

Some Problems for Further Research

On the basis of the findings reported earlier, the depressive or affective disorders appear to be related to a shortage of the neurotransmitter, norepinephrine, at brain synapses, while the schizophrenias appear to be related to the oversupply of another neurotransmitter, dopamine, which is the chemical forerunner of norepinephrine. But the situation is less simple than might appear, for all antischizophrenic drugs have been found to block the action of both these neurotransmitters to varying degrees. In addition, not only norepinephrine but also the related dopamine and serotonin are now known to be affected by some of the antidepressant drugs. Moreover, since the neurotransmitters that bridge almost 90 percent of the synaptic clefts have not yet been identified, still other brain chemicals may be involved in the action of the presently known psychotropic drugs.

Among the problems awaiting solution is the question of just how the neurotransmitters are involved in the treatment of—and presumably the genesis of—schizophrenia and the depressive illnesses. Until recently, research was hampered because the blood-brain barrier not only prevents most substances in the body from entering the brain, but also prevents substances in the brain from entering the body unaltered, thus making their study difficult. Now, however, a method for determining a metabolite of norepinephrine in blood, urine, and cerebral fluid has been developed. The metabolite is 3-methoxy-4-hydroxyphenylethylene glycol (MHPG). Through the new technique, it has been found that the urinary excretion of MHPG in manic-depressive patients varies with their emotional state. Such studies may lead to ways for answering an important question: how the various types of depressive disorder—and, for that matter, the various types of schizophrenia—differ biologically. The answers could lead both to a better understanding of the role of heredity in mental illness and to more precise means of treatment.

Other important questions include:

- How is the vulnerability of the different regions of the brain to maldevelopment affected by differences in the time at which they mature?
- How is the activity of certain genes turned on or off at different times in development?

• In what areas of the brain do hormones (and not merely gonadal hormones, on which endocrinologists have focused) affect neurons, and how?

Where Increased Effort Is Needed

If these and other questions are to be answered, the Institute will have to support a broader range of biological investigations. It should not, however, diminish support of research in neurochemistry and psychopharmacology, which now receive 58 percent of the funds for basic biological research.

An increased effort is highly recommended in:

- Behavioral genetics
- Development and growth of the brain, with particular attention to factors producing abnormal development
- Neurochemistry, including study of the biogenic amines, the cell membranes, neuronal mechanisms, and the chemistry of perception, sleep, consciousness, and behavior in general
- Neuropharmacology, including investigation of the nerves, transmitters, receptors, enzymes, and hormones involved in the metabolism of drugs and other chemical substances
- Molecular mechanisms underlying neurobiological processes
- Relation of neuronal events to sensory and motor sequences
- Development of improved methodology

Recommendation for Organizational Change

To help provide for the recommended broader program, NIMH should establish a Biobehavioral Research Branch within the Division of Extramural Research Programs. This branch should have major programs dealing with behavioral genetics (including the genetics of mental illness), neurobiology, and the biological bases of social behavior.

Psychological Influences on Behavior

Basic psychological research shares with basic biological research a desire for more information on the neural mechanisms governing man's behavior, normal and abnormal. And it shares with basic sociocultural research a desire for more information on how behavior is affected by events outside the individual. It is concerned with the processes of perceiving one's environment, responding to stimuli, learning, remembering, and thinking, and with the development of emotions, motivations, aspirations, and values.

Psychological research over the last quarter-century, with important contributions from scientists supported by or working for the Institute, has led to marked and even revolutionizing progress. This is particularly the case in basic research relevant to the psychological treatment of mental disorders and to our understanding of child development and of the factors influencing children's mental health.

Conditioning and Learning: Gains in Theory and Application

The development and application of learning theory ranks with the discovery of neurotransmitters and of drugs to treat schizophrenia and depression as one of the greatest advances in the mental health field in recent times. Within a decade of the Institute's founding, NIMH was supporting most of the leading investigators in this field and since then has become an increasingly important source of research funds. Basic research on operant conditioning, which is associated most closely with the name of the psychologist, B. F. Skinner, has led to findings with diverse applications. For example, under the name of behavior modification, the principles and techniques of conditioning have facilitated the teaching of mentally retarded persons, the removal of reading disabilities, and the correction of aberrant behavior. Under the name of behavior therapy, they are widely used in the treatment of mentally ill persons, including autistic children and schizophrenic adults. Described as programed instruction, they have vastly strengthened educational technology.

Impressive gains have been made in our information about the most effective time schedules for the delivery of reinforcements—the rewards given when a person, or animal, displays the behavior desired by the teacher, parent, clinician, trainer, or researcher. For example, research has shown that even very brief intervals between the display of the desired behavior and the offering of the reinforcement will reduce markedly the effectiveness of the conditioning; the overall effectiveness is inversely proportional to the length of the delay. Interestingly, responses that have been reinforced only on some occasions are more likely to persist, in the face of nonreinforcement, than responses that have always been reinforced. Work to expand and apply such findings—which have strong implications for therapists as well as for parents and teachers—continues.

Extensive research has dealt also with problems in classical or Pavlovian research. One is the study of conditioned fear. Under natural conditions, most organisms behave in ways that minimize contact with noxious stimuli, but occasionally animals and men show a curious inability to behave in this adaptive way. A laboratory analog of maladaptive behavior is "learned helplessness." This appears after laboratory animals have been subjected to punishment—electric shock, for example—that they can neither predict nor control. After a time they do not try to avoid the punishment even when, in the second phase of the experiment, they have been given the means to do so; they are in a state of chronic fear, much like that in some forms of depression. With repeated exposure to the second situation, however, the animals do eventually learn that they are in control, to the extent that by doing something they stop the punishment. These results, from work supported by the Institute, may have implications for the treatment of certain neurotic disorders.

Perhaps the finding with the greatest potential, from research in the learning field, is the evidence that brain waves, heart rate, and other functions considered only a few years ago to be outside the range of voluntary control can in fact be controlled by the methods of operant conditioning. Through the techniques of biofeedback, the discovery may have increasingly important medical and psychotherapeutic applications.

This work, supported in large part by NIMH, has important theoriti-

cal implications as well. Historically, operant conditioning, which is concerned with the control of voluntary behavior, has usually been considered distinct from classical conditioning, concerned with behavior under involuntary control. The recent findings seem likely to bring about a revision of behavior theory that will recognize not two but a single underlying type of behavior response.

Advances in behavior theory have been accompanied by a substantial decline in research based on psychodynamically oriented learning theories and by scientific confirmation that much learning—including that of both aggressive and altruistic behavior—occurs through observation of other people's behavior and of its consequences for them. This process is described as social learning or as modeling.

The application of learning or behavior theory to the treatment of mental and emotional disorders is further discussed in the section dealing with therapy.

Motivation vs. Behavior Theory

Research on motivation from the 1920's until recently was mainly oriented to the study of biological drives in animals. But it has become clear that motivation is a more complex matter than the model of automatic, inexorable drive implies.

One indication of the drive model's inadequacy is the fact that measurements of human motives—for example, the desire to achieve—do not predict actual behavior very well. To improve prediction it is necessary to take account of two other factors: the value an individual attaches to an outcome or an incentive and his judgment of the likelihood that he will actually be able to achieve the outcome. Therefore, it has become important to study choice, decision, and value as involved in human motivation.

According to the view that behavior is determined by reinforcement, it is unnecessary to know about motives because it is reinforcers that control behavior. As indicated earlier, much can be said in favor of this stand, particularly on the basis of work in schools, hospitals, and other institutions. However, reinforcers may be only another name for goals and values, and further research on these may broaden and strengthen the application of behavior theory.

Biological Rhythms

Many biological rhythms show orderly cyclic changes, some of which seem to occur in the absence of outside influences. Such independence of external changes suggests the existence of "biological clocks." The behavior of animals is influenced and even dictated by such rhythms. Experiments show that circumstances—including shock, noise, X-rays, a dose of amphetamine—that prove fatal to animals at one point in the 24-hour cycle merely annoy them or make them sick at another point. The lack of oxygen that would render a pilot unconscious at 4 p.m. affects him much less at 4 a.m. Evidence suggests that even the outcome of psychotherapy is influenced by its timing.

No single nervous system structure that modulates the various changes in the daily cycle has been found. There is considerable interest in the possible role of neurotransmitters.

New Information on the Psychological Aspects of Memory

Since the mid-1950's, psychologists working in this area have tended to view man as an information processor. Earlier he had been thought of as a repository of specific associations—between experiences, including verbal stimuli, on the one hand, and on the other, internal representations of experiences. Research on memory was termed verbal learning research, for it concentrated on the acquisition of verbal associations and on the rates of acquisition and of forgetting.

However, laboratory experiments began showing that man is limited in the amount of information he can absorb and process at one time, and interest turned to questions about the way this information might be coded, organized, and stored. Memory came to be viewed not as a static repository but as an active and integrative mechanism. Research has confirmed that it can be generative as well: Often memory can turn up bits of information needed to answer questions for which no prior answers have been learned.

Memory has been found to go through a number of time phases—very short term, short term, and long term, with possibly other states in between. Researchers now tend to regard the long-term memory as permanent and to view memory loss as a sign of failure in the retrieval mechanism.

A number of technical advances during the last 25 years have made it possible to study memory and other cognitive processes in terms of information-processing, through the use of computer simulations. Using data from laboratory experiments, the simulations are programed with information and assumptions about memory capacities and speed and about problem-solving techniques. This NIMH-sponsored work has led both to a general model of the processes people use to solve a particular kind of problem and to means of studying the causes of individual differences in problem solving. Moreover, to the extent that researchers can characterize the cognitive style of an individual, they have a tool for diagnosing difficulties he may have in learning or thinking.

Personality Research: A Trend Away From Freud

Research on personality and motivation in the last 25 years has turned away from Freudian theories toward a focus on socially relevant behaviors. Instead of continuing to work on intrapsychic mechanisms of defense, unconscious processes, and motivational conflicts, many psychologists have begun asking such questions as: What are the conditions that encouraged prosocial behavior? What are the actions and attitudes that enable the individual to gain greater control of himself and to achieve his goals? How can an individual modify his environment? Recent studies have included work on the role of self-instruction, self-management, and self-reinforcement.

Investigators have moved away, too, from an interest in measuring personality dispositions such as anxiety or hostility and have shown increasing interest in analyzing more cognitive dispositions, such as an individual's ideas about "locus of control" of reinforcement. Locus of control is an important concept because a person is unlikely to modify his behavior unless he believes that what he does has an effect on what happens to him.

Some Advances in Research on Perception

Perhaps the most important progress in this area has been methodological. One substantial advance has been the development of methods for studying perception in early infancy, when the most rapid changes in the development of the nervous system are taking place.

Other research, also supported by NIMH, has been concerned with improving the accuracy of experimental results. In pain perception, for example, it has been found that an electric shock or some other stimulus may or may not be called painful, depending on the social situation and such factors as the observer's attitude, personality, and level of anxiety. A theory known as signal detection provides a technique for differentiating between sensory effects and subjective effects. Other explorations have demonstrated that the so-called demand characteristics of the experimental situation can strongly influence the results of research with human beings. As a dramatic example, it has been found that many of the phenomena associated with hypnosis can be attributed to the desire of the hypnotized person to play a role, contribute to science, or go along with the implicit wishes of the experimenter.

In short, new methods of research have shown that the subject of an experiment is by no means a passive responder to stimuli. It must now be asked, among other questions, to what extent the symptoms reported by mental patients are determined by demand characteristics and mediated by cultural influences.

Since perceptual processes are involved in the acquisition and processing of knowledge, many theorists have long attempted to understand the altered mental states in psychopathology as either the result of, or as reflecting, disorders of perception. Perhaps the most familiar example has been the effort to evaluate motivation and personality with projective tests such as the Rorschach and the Thematic Apperception. Other work included studies of perceptual "defense" and "subliminal" perception. The investigators' interest in perception as related to personality and to mental states stemmed from the assumption that perceptual indicators were less subject to contamination by defense mechanisms and thus more accurately reflected fundamental dynamic processes. Improvements in methodology have shown that assumption to be incorrect. Differences in the way individuals respond to a situation are not caused by differences in the way they physically perceive it. This conclusion, reached with the help of NIMH support, has freed investigators for work in other areas.

A New Understanding of Infancy and Childhood

Careful studies of infants' senses, perceptions, attention, and ability to learn have greatly changed the image of the newborn child—from that

of an organism with principally physical needs to that of an individual with complex psychological capacities and vulnerabilities. This work, much of it supported by the Institute, has shown that an infant is capable of interacting with the environment as early as the first few days of life. He can influence his environment as well as be influenced by it. Such research increases our ability to plan infant care most likely to ensure healthy development.

Methodological advances are yielding our first real information about what an infant sees and hears. In one technique, for example, the infant is exposed to a stimulus, either visual or auditory, whose intensity he can control by sucking on a nipple. After a while, the sucking rate begins to fall, evidence perhaps of recognition that the stimulus is unchanging. A change in the stimulus may result in an increase in the sucking rate, presumably evidence that the change was detected. Such research can be used both to elucidate the pattern of normal development and to detect congenital defects—in sight or hearing, for example.

Under NIMH sponsorship, investigators have also made important progress in the study of nonhuman infants. As one example, abnormal behavior resembling the symptoms of mental illness in humans has been produced in rhesus monkeys simply by isolating the infants or by separating them from their mothers. Various techniques for treating the disturbed animals are being tried, with considerable success, and the biochemical correlates of normal and abnormal behavior—mentioned in the earlier discussion of depression and schizophrenia—are being studied.

Research on cognitive processes in children, once concerned largely with measurements of intelligence, has broadened greatly to provide findings on the nature of children's thinking. The new information includes the stages of thinking through which the child passes and the effect of the environment upon those stages. Research of the last few decades has vastly expanded our understanding of how children learn; it has also produced new information on how they develop values and goals and altruistic behavior.

Current research on sex differences and sex typing is attempting to sort out biological, environmental, and cultural bases for the psychological similarities and differences between boys and girls. The findings will have a bearing on an extraordinary number of issues in the sciences and in social policy.

In sum, developmental psychology has accumulated knowledge about how children think and learn, how they are influenced by punishments, incentives, knowledge, and how environmental conditions influence their motives, values, and achievement. This knowledge is directly relevant and applicable to family living, education, psychiatry, institutional management, manufacture of toys, writing of children's books, city planning, and understanding of intercultural conflicts.

Although this knowledge has had wide effect, glaring gaps exist between what is known and what is utilized. As one example, more is known about the psychology of learning than is practiced in education. Thousands of elementary school teachers are turned out of colleges each year, teachers whose prime concern will be the learning process, but who have never had courses in learning or cognitive theory. Similarly, many judges and law-

yers who are daily deciding the fates of children—deciding on parents for them, punishments, rehabilitation—have never had training in developmental psychology.

Psychological Research on Aging

Compared with research on infancy and childhood, the field of aging is considerably less advanced and receives considerably less support from NIMH. In part this is due to the establishment in 1960 of the National Institute of Child Health and Human Development.

An important early intramural study found that in many aspects of cerebral physiology and of psychological functioning, a sample of healthy old people had much less deficit than usually found in samples of old people either in institutions or among the general public. NIMH-supported work has reported evidence also that behavioral impairment among elderly persons has its base in isolation and loneliness.

Problems demanding research include how mental impairment in old people is related to disease processes, early environmental experiences and education, and present environmental conditions.

Social Psychology

Of the many advances in this field during the last several decades, the most significant probably has been the demonstration of the importance of groups—including peer, work, and ethnic groups and the family—for the psychological functioning and mental health of the members. Research has also confirmed that social interaction tends to be governed by a principle of reciprocity: either aggressive or altruistic behavior is likely to be responded to in kind. NIMH has supported work both in these areas and in numerous others; for example, how people perceive one another, how this social perception affects their behavior, and how changes can be produced in attitudes and opinions.

In one form of social psychological research, social problems are taken into the laboratory and simulated. In this tradition are studies on prosocial behavior; on effects of television, urban stress, imprisonment; and on aggression, obesity, smoking, and crowding. In another form the laboratory in effect is taken into the field, and research conducted on social institutions. Whether in laboratory or field settings, the study of basic social psychological processes can contribute substantially to the understanding of human adjustment, mental health, and mental illness.

Some Major Needs for Research on Psychological Processes

1. One of the most challenging problems in neuropsychology is to establish animal models as an aid in understanding the biological bases of mental illness. More work should be done, too, on memory (including memory processes in old age), perception, language, motivation, and learning.

2. In developmental psychology, more research is needed on aggressive behavior to explore what evokes such behavior and to what extent experimental findings hold true outside the laboratory. A great deal more

research is needed on how best to rear children and how to meet the psychological needs of children and adults at various levels of development.

3. In social psychology, systematic research should be undertaken on the way in which individuals are affected by the physical and social worlds. To be emphasized is research on the causes of socially significant behaviors: (a) antisocial, including exploitation, delinquency, and hostility among both individuals and groups; (b) prosocial, including cooperation and sharing; and (c) withdrawing responses, including alienation, dependency, and abuse of alcohol or other drugs. Research that examines only one factor or uses too limited a sample should be deemphasized as unlikely to advance our knowledge of the field.

4. In the support of psychological research, NIMH should work to achieve a better balance between basic and applied research. The ratio of support is now weighted toward applied research 2:1.

Sociocultural Influences on Behavior

The interrelationships between man's behavior and the society and culture in which he lives is systematically studied by social psychologists, sociologists, and cultural anthropologists. Each discipline approaches the problem in a somewhat different manner and with somewhat different methods, but their goals are similar: to define the behavior in question and to determine the processes by which it is induced, maintained, or altered by sociocultural variables.

In this summary, one illustrative area of social science research with special relevance to the Institute mission is discussed: stratification and psychological functioning. This is one of a number of topics considered in Chapter 6 of the report.

Stratification and Psychological Functioning

It is a universal feature of social life that individuals acquire differential status, honor, and power—that societies are, in other words, stratified. This fact has given rise to important questions for social scientists, among them: (1) How similar are the nature and bases of stratification in various societies? (2) How does the individual's location in the stratification system bear upon his psychological functioning—his personality, attitudes, emotions, values, orientations, mental health? (3) Why does stratification have psychological effects, and what is the critical element in class experience? Research over the last two or three decades has shed light on these questions.

Stratification in Diverse Societies. One important and general finding has been the relative invariance of ratings of occupational prestige, regardless of which country is studied. Early studies showed a high level of agreement on the relative prestige of various occupations. Regardless of which segment of the population was examined and regardless of people's own occupational levels, most Americans ranked occupations similarly, in a regular and nearly invariant hierarchy from physician to bootblack. Later studies showed that this relatively invariant ranking obtained over the next quarter-century, and that it applied to various special subpopulations—even to children as young as 9 years and to seriously disadvantaged

people. Studies in a number of other societies, including one from Eastern Europe, showed almost identical results. That the same occupations are accorded essentially the same level of respect in extremely diverse societies suggests that occupationally based systems of social stratification are essentially similar in all industrial societies.

Social Class and Psychological Functioning. Over the last several decades, evidence has accumulated that the individual's location in the stratification system bears strongly on his thoughts, dealings, and behavior. Research reveals similar relationships of class to perceptions, attitudes, and values in all industrialized countries.

Although it is not possible to provide definitive explanations of these results, promising beginnings have been made toward identifying the mechanisms that underlie the correlations. Recent findings establish a prima facie case that men's social class position affects their values and orientations, at least in substantial part, because of class-related conditions in their occupational lives. The actual concrete work that members of different social classes tend to do—particularly the substantive complexity of their work with things, with data, and with people—has major effects on how they think, feel, and act.

Class and Schizophrenia. Schizophrenia occurs most frequently at the lowest social class levels of urban society, according to evidence from research in Canada, Denmark, Finland, Great Britain, Norway, Sweden, Taiwan, and the United States—an unusually large number of countries and cultures for establishing the generality of a relationship in social science.

The evidence to date indicates that both social class and stress are probably involved in the etiology of schizophrenia, but that neither alone provides a sufficient explanation of the disorder. Genetic studies have demonstrated an inherited propensity or vulnerability, but this, too, standing alone, is not enough.

One promising hypothesis holds that the constricted conditions of life experienced by people of lower social class position may foster conceptions of social reality so limited and so rigid as to impair people's ability to deal resourcefully with the problematic and stressful. Such impairment would be unfortunate but would not necessarily result in schizophrenia. Conjunction with genetic vulnerability and great stress, however, might produce disabling impairment.

Methodological Developments in Social Science Research

Social science has been developing a number of distinctive new approaches. The past decade or so has produced both innovations in standard practice and ideas in the burgeoning stage. One source of productivity has been the increase in the number of mathematically trained and mathematically oriented scientists who have brought their expertise to bear on the problems of social science. Even more important has been the introduction and widespread use of the computer. No factor has been more important in transforming sociological methodology than the availability of computers and the development of packaged programs, which have made it possible for substantively oriented researchers to employ the newly available statistical techniques in their research.

These developments encouraged social scientists to use multiple regression analysis on a wide scale in the 1960's. This technique enabled investigators to control simultaneously a large number of variables when examining the effect of any one variable on a dependent variable, and to obtain explicit measurements of the size of the effects. Other techniques such as multivariate analysis of variance, canonical correlation, factor analysis, and multiple discriminant analysis are now commonplace in social research. In general, these methods are much stronger than the old cell-by-cell comparisons that were characteristic of quantitative analysis 10 years ago.

Secondary Analysis. This refers to the extraction of information on topics other than the focus of the original studies. One reason for the rise of interest in this area is the computer-generated revolution in quantitative data analysis, which has made it possible to store microlevel data on computer tapes, easily accessible either through remote terminals or physical transmission. Another stimulus is the increasing cost of data collection, making it likely that researchers will turn increasingly to data already gathered for the examination of their propositions. Moreover, during the 1960's, there was a substantial increase in the number, scope, and quality of data archives, where studies on a central theme are stored in one location. Although these archives still leave much to be desired, they are likely to expand and to be increasingly utilized in coming years.

Social Indicators and Policy Research. During the last decade, significant work has been done, too, in the area of social indicators. Through the development and use of such indicators, it may eventually be possible to keep tabs on major social trends in the same way that economic trends can now be monitored. Conceptual issues are still being worked out, and the appropriate dimensions for social accounting are still under consideration.

Contextual Analysis. In this type of investigation, the focus shifts from the individual to the environment within which individual behavior occurs. For example, current studies of the families of psychiatric patients view psychopathology in the individual as a product of family process rather than of a process solely within the individual himself. Also, some scientists have become interested in the relationship between the characteristics of an individual and those predominant in his environment—their dissonance or consonance. Although the idea of contextual effects is not new, the systematic, quantitative study of contexts is a recent development.

Studies of Social Change. For many years, social scientists have been concerned with the evolution and development of social systems. In recent years, theories and methods have been especially elaborated to monitor social change, to determine some of the influences leading to particular changes, and to determine the impact of change.

Such change has been studied at several levels. Sociological interest has usually focused on naturally occurring events affecting populations of substantial size rather than on controlled interventions with convenient subjects. At another level, investigators are interested in the evolution and development of small social groups. To some extent, this research parallels, on the social level, studies of individual growth, development, and senescence. Finally, there is increasing interest in how changes occur in large-scale social systems and structures. Numerous studies have attempted to assess the effects of modernization on social systems, and

in doing so have been helpful in measuring the impact of social change on individuals.

Priorities for Social Science Research

Of $11 million for social processes research in 1972, 17 percent went for basic research and 83 percent for applied. This 1:5 ratio is seriously imbalanced. Increased support of basic research is essential.

The substantive research recommendations that follow have been selected on the basis of several different considerations: (a) work of special importance or centrality to scientific progress; (b) work with strong implications for, or having a direct bearing on, mental health; and (c) new, neglected, or underdeveloped areas that show promise. The order in which the recommendations are presented does not imply a rank order of priorities.

Social Research Methodology. All science is heavily dependent on its methodology, and methodological work at present constitutes one of the most active and creative areas of social science. Such work should be strongly encouraged. The following areas in particular deserve support: (1) Multivariate methodology: (a) further development of multivariate measures for use with attribute data; (b) making computer packages for multivariate analysis of attribute data as available as they are for continuous variables; (c) continued development and assessment of statistical approaches to causal modeling. (2) Analysis of change over time: (a) further developments in panel analysis, with particular emphasis on causation; (b) methods for analysis of life histories and other longitudinal data, including use of graphical techniques, lagged regression, and stochastic models; (c) support for developing the interface between history and the more quantitative social sciences. (3) Social experimentation: a newly developing area of social research with important practical implications, since large-scale Government programs adopted and continued in the absence of knowledge concerning differential effectiveness can lead to costly partial success and even more costly failure; a number of methodological problems demand solution. (4) Causal analysis: in which one of the most prominent techniques introduced in recent years is "path analysis"; refinements and improvements are being introduced and should be encouraged.

Although the above probably represent the most active foci of methodological interest in recent years, many other areas require methodological development. These include: (1) development of techniques for studying interactions; (2) increased development and use of secondary analysis; (3) increased focus on the methodology for studying unplanned events, such as disasters and riots; (4) improvements in ethnography and participant observation; and (5) certain other promising methods, such as computer simulation, use of game theory, and use of unobtrusive measures.

Social Structure, Social Interaction, and Psychological Functioning. This topic is of central significance to the mission of the Institute. Although there is ample empirical documentation of the association between a person's location in the social structure and various aspects of his thought and behavior, the social structural variables tend to be rather

broad and remote factors reflecting a complex diversity of experience. In work on the consequences of social structure, such psychological processes as memory, learning, perception, concept formation, and cognition should not be neglected. Continued active support of research on attitudes, opinions, and values is necessary, and it is important to know more about how to measure them, how to change them, and how social structure and personality affect them. Structural sources of individual stress also demand further investigation. Research on how patterned social experience generates anxiety, insecurity, malaise, alienation, and other stress responses that may influence mental health warrants priority.

Comparative Research. One limitation of American social science is that, with too few exceptions, it studies only the United States. Such research is insufficient to establish general propositions about the nature of human society. Only when one can show that the same types of relationships among variables appear in other societies—perhaps with different cultural, political, and technological development—can one hope to establish general propositions about social process. Hence, there is a need for further comparative and cross-cultural research.

Urbanism. Certain of the characteristics attributed to urban life, such as size, density, heterogeneity, segmentation of roles, and weak normative controls, have been held responsible for a variety of social stresses and are associated with the rise in certain social problems. There is little doubt that certain of these conditions are, in fact, stressful and do generate distinctive social problems.

The years from 1950 to 1970 witnessed the highest rate of world population growth ever known, and the last century has seen a gigantic shift in the geographic distribution of people. By 1970 about 864 million people —24 percent of the world's population—lived in 1,777 cities of more than 100,000 inhabitants. By the end of the present century, if no major catastrophe intervenes, the population in such places is expected to be three times the 1970 figure. By then about 40 percent of the human race will live in cities of 100,000 or more, and around 25 percent in cities of a million or more.

There are signs—such as the American exodus to the suburbs and high rates of crime, drug abuse, and mental illness—that man's adaptation to cities and vice versa is more successful at the physical than at the social and psychological level, and that as cities increase in size, adaptation becomes more difficult. As time goes by, an ever greater proportion of our advanced technology is used simply to overcome environmental pollution and other deleterious effects of advanced technology.

In the light of the trends revealed by demographic analysis, research dealing with the social problems and psychological stresses associated with urbanization becomes urgent.

Recommendations Affecting Organization

1. The Social Sciences Research Review Committee should be divided into: (a) a Social Psychology Section and (b) a Culture and Social Structure Section. When only a few members of a review panel are experts in respect to a particular research proposal, ad hoc reviewers should be used.

2. An Office of Secondary Analysis, comprising one or two persons, should be established in order to facilitate the use in new research of appropriate survey data collected previously.

The Role and Future Support of Basic Research

In analyzing the NIMH research program, the Task Force has defined two broad and often overlapping types of research as follows:

Basic research is the study of underlying processes or mechanisms, such as the process by which brain cells transmit information and the processes that influence the development of antisocial behavior. Preceding sections have discussed developments in basic research conducted by biological, psychological, and social scientists.

Applied research, in the context of mental health, is the clinical study of particular disorders, or studies directed toward prevention or treatment. Other terms used by the Task Force in referring to this type of research are "targeted," "problem-oriented" and "categorical."

The Institute's mission cannot be accomplished without both kinds of research, and its policy must be directed toward the most effective division of support. This is sometimes hard to achieve amidst political pressures.

Basic research offers the bank account, so to speak, from which applications of research are drawn. Without basic findings, applied research becomes a costly matter of trial and error, for there is no fundamental understanding of natural process on which to build.

Basic research, though, requires an investment with no strings attached, for it offers no specific end-products, no guarantees. Moreover, the investor must conceive of basic research not as a discrete project but as an unfolding process; the experiment that fails in one generation may provide a triumph of insight for science at a later stage. To anyone interested only in quick solutions to pressing problems, therefore, basic research is hard to defend.

In recent years a number of people, some of them influential in determining Federal research funds, have become skeptical about the value of basic research. They find it difficult to understand scientific interest in basic processes when the overwhelming need, everybody agrees, is for sure means of preventing or curing mental disorders. This skepticism, though understandable, could retard the Institute in its overall mission.

Scientists, no matter what segment of the mental illness problem they have made their immediate concern, look toward the same ultimate goal, prevention or cure, as everyone else. But they point out that it can hardly be reached without understanding the central nervous system and the factors—in the individual's physiology and chemistry, in his thoughts, attitudes, and goals, and in his social milieu—that bear upon its functioning. Decades of work in many fields of science have demonstrated that basic research is the pathway to real solutions to problems in the long run.

As is better known in the realm of physics and allied disciplines, such as rocketry and electrical engineering, the network of research that leads to an important contribution may evolve over many years, and the fallout from a single fundamental discovery may affect millions of lives.

Today, for instance, a revolutionary approach to understanding and treating psychoses is opening because of 75 years of research into the organization and functioning of the central nervous system. One finding in this vast unfolding was that messages were transmitted from nerve cell to nerve cell through chemical activity at nerve cell junctions. Neurotransmitter research, currently a hot field in science, is yielding important information on how chemical events in the brain may affect behavior.

In those 75 years of research, not one of the scientists—representing many disciplines and a number of nationalities—was looking for answers to anything except how body and brain function. Yet the investigators were, in fact, preparing the way for discoveries likely to change the lives of millions of people affected by severe mental disorders.

The discovery of chlorpromazine for the treatment of schizophrenia is often cited as the most outstanding single, practical contribution to psychiatry in several decades. This drug and other tranquilizers have helped free a multitude of people from mental institutions, and they help to keep another multitude out. Leading up to the discovery were 67 years of research on the chemical family to which chlorpromazine belongs, research whose first participants were interested in the European dye industry, not mental illness. Chlorpromazine itself was synthesized in 1950 as the result of a search, not for an antipsychotic compound but for a drug useful in the management of surgical shock. After chlorpromazine proved effective for schizophrenic patients, a closely related drug, imipramine, was tested in the hope that, it, too, would show antipsychotic activity. It did—not against schizophrenia, however, but against depression. Millions of people the world over have been helped by drugs that stem from that long, rambling set of unconnected researches.

The route to a discovery and its application can be traced in retrospect; hardly ever can it be laid out in advance.

Division of Resources

In FY 1972, as the table shows, 44 percent of the Institute's total research budget of $79.4 million was allotted for basic research. Of the intramural budget, 81 percent was spent on basic studies; of the extramural budget, 35 percent.

Distribution of Funds, FY 1972
for Basic and Applied Research

	Basic Millions of $	%	Applied Millions of $	%
Intramural*	13.27	81	3.06	19
Extramural	22.07	35	40.97	65
Total NIMH	35.34	44	44.03	56

* Included are $5.6 million to NIH Management Fund. Excluded are expenditures of National Institute on Alcohol Abuse and Alcoholism, Mental Health Study Center, Addiction Research Center (Lexington), and Overholser Division of Research and Training (St. Elizabeths).

The position of basic research now is considerably less favorable than in the past. The extramural research program accounts for 80 percent of

NIMH research expenditures, and here, about one-third of the money goes for basic research; two-thirds, for applied research. Until a dozen years ago the ratio was just the other way around.

Another measure of the downward trend in the support of basic research can be seen in the proportion of approved grant applications that were actually funded. Between 1971 and 1973, for basic research, this dropped from 64 to 37 percent. For other research, it dropped from 82 to 59 percent. Over these 3 years, not only was the funding rate for basic research lower to begin with, but also it declined more rapidly (with a 42 percent drop for basic research compared with a 28 percent drop for applied).

The intramural program, comprised largely of basic research, mirrors the same trend. From 1966 through 1974, the intramural staff underwent a 20 percent reduction.

Distribution of Research Effort by Major Fields

In 1972, biological research accounted for 39 percent of the Institute's support for general mental health research (excluding studies on alcohol and drug abuse); psychological, 38 percent; social science, 15 percent. Chapter 7 of the report analyzes the distribution of funds across these major categories by type of research, basic or applied; type of program, intramural or extramural; and major substantive areas.

Major Findings and Recommendations

A review of the size and distribution of NIMH programs in basic research leads to the following recommendations:

1. Basic research on biological, psychological, and sociocultural processes cannot be planned to nearly the same extent as applied, or targeted, research. The criterion for funding both basic and applied research is and should continue to be scientific excellence, which includes considerations of relevance to the NIMH mission and of ripeness or researchability of the scientific problem to be addressed. Peer review in all NIMH research programs, through bodies like the initial review groups in the extramural program, provides the best means of ensuring scientific excellence.

2. Various analyses of scientific achievement suggest that basic research continues to be the principal source of scientific knowledge, a fundamental and sound investment for the future. Yet the last decade has seen an increasing trend toward lowering the proportion of the Institute's resources devoted to such investigations. Since basic research generates the fundamental knowledge that is essential for alleviating mental illness and strengthening mental health, this trend toward reducing its support should be halted and reversed.

3. The Institute should: (a) support a broader range of basic biological investigations; (b) work to achieve a better balance between basic and applied research in psychology; and (c) endeavor to increase funds for basic sociocultural research and to establish a more reasonable balance between basic and applied sociocultural studies.

Research on Mental Illness and Behavior Disorders

The period since the inception of NIMH has been marked by a significant increase in the support of research directed specifically to mental disorders and emotional disturbances and by a decrease in emphasis when contrasted with other research. In the early years, research directly on mental illness, along with research on treatment, constituted more than 65 percent of extramural grant support. By the time of this study, the proportion had dropped to about 15 percent.

Foremost among the factors responsible for this change were legislative pressures to focus research on such emerging concerns as alcoholism and drug abuse; a broadening concept of mental disorders that includes such problems as crime and delinquency; and an increasing emphasis by scientists on basic biological, psychological, and sociological studies in seeking the causes of mental illness—an emphasis principally responsible for the notable progress against mental disorders during the last 25 years.

One hundred forty-eight different disorders, grouped into 10 major categories, are listed in the Diagnostic and Statistical Manual of Mental Disorders, published by the American Psychiatric Association (APA). Of these, the Task Force was concerned mainly with schizophrenia, affective or depressive disorders, organic brain syndrome, psychoneuroses, psychosomatic disorders, childhood mental illness, alcoholism, and drug dependence. The last two of these are discussed in Chapters 9 and 10, respectively, of the report. The others are discussed in Chapter 8, which is summarized here. They were considered from two perspectives: developments in the scientific approach to these problems, and development in research directly relevant to the specific disorders.

Major Research Trends

The expanded research activity over the last 25 years has been marked by a number of research trends that have produced significant advances in knowledge. The trends have included:

1. A shift away from oversimplified theories about the development of mental illness. The importance of the interaction of biological, psychological, and sociocultural factors has been recognized.

2. Striking biological advances, including: (a) evidence that genetic factors play an important role in schizophrenia and depressive illness, and (b) discovery that certain pharmacological agents will exacerbate and others ameliorate those disorders. These drugs affect neurotransmission.

3. Major developments in psychological and sociocultural research, including: (a) methodological advances in quantifying observations and judgments of symptoms and behavior; (b) demonstration that the prevalence of schizophrenia is highest in the lowest social classes of large cities, as discussed earlier; (c) an increasing emphasis on long-term studies, particularly of children at high risk to psychosis, to learn what factors contribute to the development of mental illness; (d) progress in the field of learning or behavior theory, which has made major contributions to the understanding and treatment of mental disorders; and (e) a focus on the family as a contributor to the development of mental disorders.

Biochemical Factors in Schizophrenia

In spite of long and continued intensive research, no biological abnormality linked consistently with schizophrenia has been discovered. Under investigation, however, are highly promising clues to at least some of the biochemical mechanisms probably involved.

Research has shown, for example, that drugs useful in treating schizophrenia block the action of two brain chemicals, dopamine and norepinephrine, at the synapses. Very high levels of the therapeutic drugs, however, produce symptoms like those of Parkinsonism. In turn, this condition has been linked to a deficiency of dopamine and can be treated by raising the level of dopamine. When the same treatment is tried in schizophrenia, it tends to aggravate the illness. Thus, it appears that schizophrenic symptoms may be produced by abnormally high levels of dopamine or related biochemicals. Such levels of dopamine-related enzymes in the brains of schizophrenics have in fact been reported but not confirmed.

Another hypothesis, first formulated in the early days of NIMH, suggests that schizophrenia may be caused by the synthesis in the brain of mescaline, or some other hallucinogenic drug, which is chemically related to norepinephrine and other brain chemicals. If an abnormal substance of this sort does exist, it is very likely related to an abnormally functioning enzyme. One enzyme that is strategically placed for the proposed transformation is monoamine oxidase (MAO). A deficiency in MAO activity in the blood platelets of some schizophrenic patients has been reported but remains to be confirmed.

Biochemical Factors in Depression

Investigators have produced evidence that in the depressive disorders, as in schizophrenia, either norepinephrine or dopamine, or both, are involved. Depression may result from a functional deficit of one or both of these transmitters at brain synapses; mania, which is coupled with depression in some patients, from an oversupply. Part of the evidence springs from research on two groups of drugs used in treating depression. Both of these increase the action of the transmitters. The hypothesis that an oversupply of the transmitters can trigger manic episodes is supported by studies of breakdown products in the urine and cerebrospinal fluid of manic patients.

A similar hypothesis involves serotonin, another possible transmitter. Suspiciously low levels of its principal metabolite, or breakdown product, have been found both in the cerebrospinal fluid of depressed patients and in the brain tissue of patients who committed suicide.

The Growing Emphasis on Genetic Factors

Research during the last decade has provided definitive evidence that heredity has a prominent, but no means exclusive, role in the development of schizophrenia and the affective disorders. The presence of a genetic factor presumably implies the existence of a genetically transmitted protein defect, since the only way that genes can transmit their messages is through alterations in enzymes and other proteins. Thus, it may be possible eventually to test for such a factor.

Heredity in Schizophrenia. Recent genetic studies indicate that the disease itself is not inherited but that a predisposition to it, or perhaps to psychopathology in general, almost certainly is. The concordance rate for schizophrenia in identical twins, which was thought to be 80 percent at the time NIMH was founded, has been shown in careful, recent studies to range from 25 to 40 percent. The rate of schizophrenia in the general population is 1 percent. The risk for second-degree relatives of a schizophrenic person is 2-3 percent; for first-degree relatives, about 10 percent; and for twins of schizophrenic persons and the children of two schizophrenic persons, higher yet. Recent adoption studies showed that the children of schizophrenics had a rate of 7 percent for schizophrenics and of 28 percent for "borderline" or "schizophrenia-spectrum" disorders; in contrast, 18 percent of the children of normal parents were affected. All these children had been raised in normal families since early childhood.

Presumably, environmental factors are necessary to bring any genetic propensity to mental illness into play, but these are not yet clear. A number of scientists with NIMH support are studying children at high risk to schizophrenia—particularly those born of a schizophrenic parent—in an effort to determine which pre-illness conditions and characteristics are linked to the development of the disease.

Heredity in the Depressive Disorders. In the general population, the risk of developing manic-depressive illness is less than 1 percent, but among first-degree relatives of patients it rises as high as 11 percent. Concordance rate among identical twins are reported to range between 50 and 100 percent; among fraternal twins, between 0 and 40 percent. Further evidence of a genetic factor in manic-depressive disease comes from studies indicating that in at least some cases, the illness is transmitted from mother to son and that it is linked to the loci for red-green color blindness on the X-chromosome.

In depressive disease without episodes of mania, evidence for a genetic role has also been found, but it has not yet been quantified.

The Role of the Family

Two decades ago, interest in the family as a contributor to mental illness and behavior disorders began to rise. First came studies of psychopathology in members of a patient's family; then of pathological relationships among the members; finally, of communication patterns within the family—not what was said but how it was said. Family research led to other exciting concepts, such as the double-bind hypothesis, which proposed that the parents of children who become schizophrenic have subjected them to a contradictory, no-win situation, which forces them into withdrawal.

One team of NIMH investigators found it could use communication styles to distinguish families with schizophrenic offspring from those with normal, neurotic, or character-disordered offspring. It reported also that the frequency of communication deviations manifested by parents—such as peculiar language, overexactness, or blurred meaning—was highly predictive of the severity of illness in offspring. The major findings of these investigations have been replicated in several other settings.

This work has led to new hypotheses about the family's role in the development of schizophrenia; its role in the development of language and

stress in general; and its possible interaction with genetic and stress factors in the occurrence and perpetuation of the disorder.

Disturbances of family processes may be secondary to the illness, rather than a cause, but continued work in this area may at least provide clues to more specific ways of helping families with schizophrenic offspring and of assisting in the rehabilitation of the patient. In one line of research, the parents of a normal child are studied as they interact with a young schizophrenic; and their normal child is studied as he interacts with parents who have a schizophrenic child. The first such study found some evidence that normal parents had a normalizing influence on schizophrenics.

Studies of children at high risk of schizophrenia may determine whether disturbances in the family precede the development of schizophrenia or follow it.

Experimental Psychological Studies in Schizophrenia

These studies indicate that schizophrenics, compared with normal individuals: (1) have a greater tendency toward stimulus avoidance; (2) show a greater inability to maintain attention and set; (3) show a deficit in appropriateness of their categorizations and generalizations; (4) are harder to involve in experimental tasks; (5) show disturbances in autonomic functioning; for instance, their arousal level is not so directly related to the demands of the situation; and (6) are more socially withdrawn and perform more poorly in tasks involving social stimuli.

However, major questions remain about the variability, reliability, and etiological significance of the findings.

Diagnostic Problems in Schizophrenia and Depression

Significant advances have been made toward the goal of providing researchers and clinicians with quantified measures of symptoms, affective states, and social behavior. It has thus become possible to compare the effects of different kinds of treatment and to study the occurrence and manifestations of mental illness in different parts of the world.

As one result, major differences between the United Kingdom and the United States in statistics on schizophrenia and depression have been traced to differences in diagnostic practices. The American concept of schizophrenia appears to be far wider than the British. It embraces many patients whom British psychiatrists would regard as suffering from mania, depression, neurotic illness, or personality disorder. Such differences have serious implications for international communication on such problems as the reporting and interpretation of research findings, clinical practice, and the training of clinicians.

In another advance, the typology that distinguishes between "process" schizophrenia (which has a slow, insidious onset) and "reactive" schizophrenia (which occurs suddenly, after clear precipitating circumstances) has been found to predict the outcome of treatment more accurately than the current APA typologies. Some researchers have hypothesized that the process type is likely to involve a more prominent biological component.

As part of the International Pilot Study of Schizophrenia, which is supported by NIMH, the U.S. team of investigators is attempting to revise and standardize prevailing classifications. It appears from this work that symptoms alone are not good predictors of outcome.

Early findings from cross-cultural studies supported by the Institute indicate that the core features of schizophrenia are universal, at least in industrial societies. Studies in Hawaii, though, have found marked differences in the behavior and emotions of people with similarly severe psychoses.

In the case of the depressions, a major advance has been made by distinguishing between unipolar and bipolar illness. In the former, depression alone is experienced; in the latter, recurrent episodes of both depression and mania. The problem of distinguishing among the various types of unipolar depression awaits further research.

Despite progress, there is still a lack of techniques sufficiently sensitive to invariably detect differences between certain emotional states, such as apathy and depression, or to monitor changes in clinical condition. Techniques for measuring the biological aspects of depression have improved more rapidly than those for gauging its behavioral aspects. Also lacking is an accurate, standardized measure of psychopathology in the general population.

Organic Psychosis

Patients with organic psychosis—sometimes called organic brain syndrome—occupy about one-fourth of the country's mental hospital beds; yet of all mental illnesses, this group of disorders has been the most severely neglected by researchers. The group comprises a number of conditions resulting from diffuse impairment of brain tissue function. Among these conditions are presenile and senile dementia, alcoholic psychosis, and impairment of brain tissue function associated with trauma, vascular disease, neoplasms, infections, drugs, nutritional disorders, and childbirth.

It has been estimated that one million Americans could be certified for admission to a mental hospital because of senile mental disorders. However, many of the aged who are in mental hospitals are actually not mentally ill; they have been sent to the hospital because there is no other place for them to go. For most senile and presenile psychosis, no effective drug or other organic therapy exists. To what extent the paucity of therapies is the result of extremely little research activity is an important question.

The little research being done on such conditions is generally performed outside the mental health field and published in journals—of neurology, geriatrics, internal medicine—that people who actually take care of patients with organic psychosis seldom read. Consequently, patients with disorders that are potentially amenable to treatment, disorders that may masquerade as organic psychosis, may be misdiagnosed. For example, patients with myxedema, vitamin deficiencies, abscess, subdural hematoma, aneurysms, tumors, or other conditions that could be successfully treated with chemicals or neurosurgery may be deprived of such treatment and exposed to permanent brain damage or death. In addition, a small number

of persons with a recently described disorder called "normal pressure hydrocephalus," a form of presenile dementia that can be treated by relatively simple surgery, remain generally undiagnosed and untreated.

Research on organic psychosis could provide valuable information on how various kinds of psychopathology develop. Several clues, for instance, lead researchers to believe that some forms of dementia are of viral origin. In addition, research could well produce better treatment for the millions of people who suffer from some form of this widespread psychosis.

Psychoneurosis

Although the psychoneuroses are probably the most prevalent form of mental disorder, researchers have given them little attention. Yet the neuroses can lead to such social problems as reduction of productivity, disruption of the family, and criminality, as well as to excessive personal distress. Some neuroses are manifested as a specific type of disorder, such as hypochondria, obsessive-compulsive neurosis, and hysteria; others, as repetitious, maladaptive behavior.

One major reason for the lack of research interest is the present climate of concern with the major psychoses and drug-induced conditions. Another is probably the difficulty in defining the subject. One view sees the neuroses as simply a milder form of mental illness than the psychoses; indeed, research on schizophrenia has shown that some neuroses occur in the families of schizophrenics more frequently than would be expected. Another view sees the neuroses and the psychoses as entirely separate disorders. NIMH support of studies on diagnosis and cause has been low.

Several new conceptions of neurosis have arisen in recent years, including one that, as discussed earlier, sees neurotic depression as "learned helplessness." Such concepts open new approaches to research. The most compelling need in this area, however, is to clarify and standardize definitions of the neurotic disorders.

Psychosomatic Disorders

The Institute has supported a large share of the psychosomatic research carried out in this country. It terms of dollars, NIMH support increased greatly during the early years, reaching a peak of more than $1 million annually in the mid-1960's, and has recently declined. However, in terms of the proportion of research grant funds devoted to such research, Institute support has dropped substantially.

The research has demonstrated conclusively that psychological events, such as various forms of stress, can evoke changes in hundreds of physical or chemical variables. Many of these changes are similar to those believed important in causing physical diseases. Moreover, using psychological evaluation only, investigators have predicted whether or not people were liable to peptic ulcer, hypertension, and coronary heart disease. Some investigators, also, have found a relationship between, on the one hand, a personal loss (of a loved one, for example, or a job, or a home) and consequent depression, and, on the other hand, susceptibility to illness.

It cannot be said that the research as yet has resulted in major advances in the prevention or treatment of serious somatic illness. But it definitely has provided a scientific basis for the age-old generalization that

perturbations of the mind cause perturbations of the body. It has implicated the psychological element in virtually every physical disease.

NIMH now supports only a limited pattern of research on psychosomatic illness, but other Institutes of Health are active in this area.

Substantive Recommendations for Research on Mental Illness

Schizophrenia and Depression

1. The Institute should strongly support both clinical investigation of biological factors in these two groups of disorders and basic neurobiological and neuropharmacological research. As in the rest of medicine, clinical researchers in mental illness can only apply the findings of scientists working at more basic levels. Investigation of the role of the neurotransmitters in these two major psychoses deserves special attention.

2. Adoptive and other studies, including research on high-risk groups, must be supported in order to disentangle the genetic components of these psychoses from the psychosocial components.

3. New approaches intended to study psychosocial factors more systematically and reliably should be encouraged. There is strong evidence that these factors, along with the biological elements, play a major pathogenic role. It is essential that appropriate balance be maintained in the support of psychosocial and biological approaches. Essential, too, is the study of factors that affect the adjustment of schizophrenic patients to the community.

4. NIMH must support further efforts to standardize the procedures used to characterize each group of mental disorders and to develop better diagnostic techniques. Such techniques probably will require simultaneous measurement of many aspects of biological and psychological functioning.

5. In 1970 NIMH inaugurated the Clinical Research Branch Collaborative Study of the Depressive Disorders to encourage research on how biological, psychological, and environmental forces combine to create the depressive state. This program should be expanded.

Organic Psychosis

6. Research should be undertaken on all aspects of the organic psychoses. Particularly needed is research directed toward better diagnostic techniques and new somatic treatments. (The ability to differentiate precisely between organic and psychological disorders would lead to immediate advances in the treatment of depressive states in elderly people.) It is also important to determine if biological processes involved in schizophrenia and depression, so-called functional psychoses, are involved also in the organic psychoses. Research on the latter may advance our understanding of the former.

Psychoneurosis

7. Research on the psychoneuroses is not commensurate with their public health and social consequences and should, accordingly, be stimulated. The greatest immediate need is for means of dealing with the basic methodological difficulties, including those of diagnosis and sampling.

Psychosomatic Diseases

8. In view of the magnitude of the problem and the inadequacy of

the present level of research, the Institute should take the following actions: (a) Foster sustained collaborative psychosomatic research programs in appropriate settings, which include a few of the outstanding medical schools and the NIH Clinical Center. (b) Give high priority to *prospective* longitudinal studies of manifest somatic illness. These studies should be designed to demonstrate the mechanisms of onset. (Sufficient attention appears to have been given to *retrospective* studies.) Likewise give high priority to prospective studies of apparently healthy groups. Include psychosocial assessment of patients. Try to involve NIH in the recommended studies. (c) Support experimental clinical studies of somatic effects of psychosocial manipulations. Strongly support animal studies relevant to psychosomatic problems.

9. In research on treatment: (a) Give high priority to exploring the potential of operant conditioning techniques in the treatment of diverse somatic illnesses; (b) Further examine and consider giving more emphasis to research pertaining to the role of psychotropic drugs in the management of somatic illness; and (c) Encourage research on psychotherapy, in the family setting, in the management of chronic, relapsing diseases in children.

Recommendations for Administrative and Organizational Change

In the course of the Task Force study, vigorous disagreement was expressed as to what constitutes the best distribution of resources between the biological and the psychosocial approaches to the study of mental illness. The Biological Subcommittee of the Study Group on Mental Illness and Behavior Disorders reported that the current allocation of research funds "does not reflect the increasing evidence of the major role of biological factors in serious mental illness." The Psychosocial Subcommittee on the other hand, found that the support "appears to be balanced." The disagreement led to a conclusion that the Institute must support a wide variety of research approaches, as called for in the following recommendations:

1. The Institute should develop administrative mechanisms to systematically and periodically review programs and overall program balance rather than individual research projects.

2. Most extramural research support should continue to be allocated through the investigator-initiated research grant mechanism, which is based on peer review. Whenever desirable, though, program managers should be able to use special research grant and contract mechanisms as well. Review of research contract proposals must reach the same level of effectiveness as the grant review process.

3. NIMH should continue a broad-based basic and clinical laboratory of the highest quality. It should also establish a model laboratory for research and training in psychopathology. This laboratory would provide the resources for nationally coordinated research on critical issues and national and international programs to develop and evaluate new treatments and study the bases of mental disorders. The laboratory would also serve as a central planning base and would help bridge the gap between the Institute's extramural and intramural research programs.

4. The Institute should construct a facility to bring together its clinical and basic intramural research activities. Over a period of time, such a facility would probably cost less than the separate facilities now used.

5. The Institute should establish a genetics branch, comprised of intramural and extramural units, to undertake and to stimulate new programs of basic and clinical research in this increasingly important field.

6. NIMH should establish three new clinical research centers, located in major universities, to test important scientific, primarily biological theories concerning the etiology and treatment of mental disorders. It should also establish research centers, based on catchment areas, in which psychological, sociocultural, and biological studies are all carried out in the context of a treatment network.

7. The Institute should establish a scholarship—or sabbatical—center where scientists could spend a year or more helping to meet the pressing need for reflecting upon, synthesizing, and integrating research findings, and for developing new information through research.

8. A unit should be established within NIH-NIMH having the sole mission of fostering psychosomatic research and, to that end, achieving close working relationships among all categorical Institutes.

Research on Critical Development Periods

Throughout its history, NIMH has given special emphasis to research focused on two critical periods in human development—childhood and old age. The Institute's programs in these areas are summarized here

Child Mental Health

Between one-fourth and one-third of the Institute's research efforts through the years have gone to studies dealing with the mental health of children. This large investment springs not only from a natural concern with the well-being of the young but also from sound scientific strategy. A major key to adult adjustment and mental health lies in the events of childhood.

Since 1970, when the Institute gave first priority to child mental health, research in that area has increased in both the extramural and intramural programs. In 1973 grants for child mental research amounted to $11.1 million, or 25 percent of the extramural budget (38 percent, if studies of secondary relevance to child mental health are included). Intramural research in that area totaled $2.5 million in 1972, or 15.6 percent of the intramural budget.

Basic studies relevant to child mental health have provided new information of the role of heredity in mental illness, a new understanding of psychological development during infancy and childhood, and a greater appreciation of social influences on the well-being of the child. The range of applied research has extended from the impact of prenatal counseling to problems of college stress.

In Chapter 8 of the report, the section on child mental health describes recent research on learning disorders, antisocial behavior, and childhood psychoses, and makes recommendations for future studies.

Learning Disorders. Learning disorders represent the major single cause of school dropouts and constitute one of the major problems of children and young people who have been referred to clinics and juvenile courts.

Among the probable causes of learning disorders, research over the last half dozen years has pointed to genetic defects, prenatal and perinatal complications, postnatal brain trauma and infection, inadequate teaching, cultural deprivation, sensory defects, emotional problems, and the complexities of English spelling.

Preliminary results from an Institute-supported study indicate that the precursors of reading disability can be identified several years before the disorder is apparent. The finding offers hope that this serious problem can be prevented. Another study reported that when children with reading handicaps were diagnosed during the first two grades of school, more than 80 percent could be brought up to normal levels. This proportion dropped sharply when the diagnosis was made during later grades. Although this finding has not yet been substantiated, studies with animals and human beings do indicate that if intervention is to succeed, it should occur early, at a time when the central nervous system is more plastic and responsive.

One major goal of clinicians and researchers should be an objective classification system under which a child would be diagnosed in terms of the type and the extent of his learning disability. This classification should not be confused with what is inferred to be the cause of the problem. Too often under present practice, this is said to be brain damage. Since classification may well affect the way a child is treated and thus influence his psychological development, inferential diagnosis is a grave matter. An objective system would facilitate research on the relationships between specified learning disabilities and such factors as heredity, events at or near birth, developmental milestones, and environmental circumstances.

Antisocial Behavior Disturbance. The category of antisocial children includes a large proportion of those called delinquent or predelinquent, hyperactive, or underachievers, as well as many children with specific learning disabilities. A recent epidemiological study by an English investigator found that of all the childhood psychiatric disorders in his purview, antisocial behavior was the most common category. It accounted for two-thirds of all psychiatrically disturbed boys and one-third of psychiatrically disturbed girls in the sample studied.

According to research surveys, children exhibiting antisocial behavior typically have histories of problem behavior dating back at least to their first school years. Early maturation has been suggested as a contributing cause, and some investigators have found evidence of neurological abnormalities. An NIMH scientist studying hyperactive children has found a high incidence of minor physical anomalies suggestive of "chromosomal irregularities or some kind of insult affecting embryological development."

Antisocial parents, whether natural or adoptive parents, are more likely to produce antisocial children than other parents. The development of antisocial behavior is also associated with negligent child-rearing

practices and broken homes, especially those dominated by tension, neglect and poverty. Several studies report that young people who abuse drugs are more likely than others to come from unstable families with little cohesiveness and a great deal of stress and conflict.

Antisocial children have high rates of reading disability and school failure, though no marked intellectual impairment. It is not clear whether the school problems are a cause of behavior disorder or an effect.

Antisocial behavior is frequently continued from childhood to adult life. One study of antisocial children who had been referred to a guidance clinic indicated that only 16 percent stopped their antisocial behavior before age 18 and had no further psychiatric problems by age 40. On the other hand, clinic patients and controls who were free of serious antisocial behavior as children were free of it also as adults.

Prevention and Treatment of Antisocial Behavior. Attempts to prevent such behavior in children thought likely to engage in it or to prevent the emergence of more serious behavior than yet shown have been uniformly disappointing. However, treatment programs for children classified as delinquent or referred for psychiatric care have shown short-term success. As a rule these cases have not been adequately evaluated over the long run, with one notable exception—a vocationally oriented psychotherapy program for delinquent boys, in which benefits persisted for at least a decade.

Behavior modification techniques have been demonstrably effective in the short term. So have stimulant drugs, which have a calming rather than a stimulating effect on hyperkinetic children. However, authorities disagree on the advisability of prescribing stimulant drugs. They disagree also on the appropriateness of ascribing hyperactivity to minimal brain dysfunction unless there is solid neurological evidence.

Among the needs for further understanding of antisocial behavior are: (1) studies to test genetic theories; (2) studies to learn if school failure or severe reading retardation can precipitate antisocial behavior; (3) evaluation of educational efforts with disadvantaged children to determine their effect on social competence and not merely on IQ and school achievement; (4) exploration of the effects of lack of discipline on child behavior; (5) research on the belief systems and depression levels of antisocial children and the ability of these children to feel anxiety; (6) scientific, long-term evaluation of treatment techniques.

Childhood Psychoses. The psychoses of childhood are often divided into three main groups: (1) infantile autism; (2) the rarer psychoses, sometimes termed "disintegrative" or "regressive," that occur between the ages of 3 and 5 following a period of normal development; and (3) schizophrenia beginning later in childhood. A number of cases do not fit readily into any of these groups.

Infantile autism: Research strongly indicates that the symptoms of this disorder are probably caused in large part by a cognitive, perceptual, or language deficit. Neither the precise boundaries of this deficit nor its cause have been found. Overt neurological disorders appear only infrequently. But several investigators have found that at least a sizeable minority of autistic children do have indications of some kind of organic brain dysfunction. These findings may apply only or mainly to autistic children with low IQ's.

Autistic children tend to have a characteristic pattern of abilities, with low scores on tests involving language or sequencing, and higher scores on tests involving visio-spatial skills or short-term memory. The overall level of intelligence is normal in about one-fourth of such children; the others are mentally retarded to a greater or lesser degree.

Though there is some evidence that autistic children may have been slightly more at risk to perinatal complications than other children, the difference is not great enough for such complications to be regarded as a common cause of autism.

Very little, if any, scientific evidence supports the hypothesis that autism can be caused by parental behavior. It has not been possible, though, to determine just how parents did behave before autistic symptoms appeared. Research has tended to confirm the old observation that parents of an autistic child tend to be of higher intelligence and higher socioeconomic level than either the general population or the parents of children with other psychiatric disorders.

Research by NIMH-supported and other investigators has shown that behavior modification techniques can be very useful as a means both of treating autism and of investigating its nature. Parents are being used increasingly as therapists. Several studies have shown the value of special schooling.

In further research on autism, particularly rewarding should be studies to delineate the boundaries of the cognitive, perceptual, or language deficit that now seems to be a principal factor. The question should not be, "What cognitive deficits are associated with autism?" but "What cognitive deficits have to be present for autism to develop?" Among other questions to be answered: (1) Besides the cognitive deficits, what environmental or personality variables, if any, are required for autism to develop? (2) How many cognitive deficits lead to social and behavioral problems? and (3) To what extent are these problems inevitable, and to what extent preventable?

A detailed study of individual behaviors may be just as informative as studies of the syndrome as a whole. Included in such studies should be analyses of which factors induce the symptoms and which reduce them. Particularly requiring study is the absence of social development. Other symptoms warranting analysis include self-injury, repetitive movements, and attachment to objects.

In research on treatment, more attention should be paid to the handicaps of the children studied, in order to provide better measures of outcome, and the studies should focus on preschool children in whom secondary handicaps have not yet become established. Studies to determine which specifics of education bring particular benefits to particular groups of children should be worthwhile.

Childhood schizophrenia: Much of the research on childhood schizophrenia cannot be evaluated because the children studied were not clearly described. In many cases the groups appear to have been composed largely of autistic children.

Since childhood schizophrenia has been subjected to very little systematic study, a wide range of investigations is needed. Among these should be studies of precipitating factors, of developmental factors before

the advent of psychosis, of family influences on the course of the disorder, and on genetic factors. In studying the precursors of schizophrenia, issues needing resolution include: (1) What is the difference between schizophrenia with childhood antecedents and schizophrenia that occurs without them? and (2) In what ways, if any, do schizophrenics with schizophrenic parents differ from other patients with this disorder?

Disintegrative or regressive psychoses: Practically nothing is known about this rare group of psychoses. Post-mortem studies have usually shown cortical degeneration, but these need to be repeated using modern histopathological techniques.

Major Recommendations for Research on Child Mental Health

1. The Institute should do everything within its power to advance the formulation and use of clearer standards of classification. Improper labeling denies children access to the services they need and may exacerbate the original condition. Yet confusion in the diagnosis of the psychiatric disorders of childhood is common.

2. NIMH should give considerable support to longitudinal research of high quality: (a) to determine more precisely the factors involved in child mental illness and health; (b) to identify potential problems early; (c) to discover the factors that make many children even in high-risk groups apparently invulnerable to mental disorders; and (d) to test preventive and remedial measures over both short and long periods. The children in these studies, which will help meet the need for better classification standards, should be followed to adulthood. In addition to initiating studies, the Institute should make use of existing data bases, such as the Collaborative Perinatal Project of the National Institute of Neurological Diseases and Stroke.

3. The Institute should support long-term followup studies to compare the various treatments for each disorder. It is particularly important to study minimal brain dysfunction, with and without pharmacological intervention.

4. The Institute should take a much more active role in promoting methodological rigor in research on problems related to child mental health.

5. The Institute should support followup studies of individuals who suffered from the recognized categories of disorders as children.

6. Research on treatment outcome should be broadened, and evaluations should be made of the efficacy of institutionalization for disturbed children, retarded children, and juvenile delinquents as compared with alternatives such as family counseling, special classes, and foster homes.

7. The Institute should substantially increase the development and use of research manpower in the area of child mental health through such existing mechanisms as training grants, research fellowships, and senior research scientist awards. To the same end, it should foster training as part of the activities of the catchment area research centers, recommended earlier, and it should establish annual awards for outstanding achievement in child mental health research.

Recommendations for Organization and Management

1. NIMH should classify child mental health research into three areas: (a) research of paramount importance to the Institute's mission, for which NIMH should be the primary funding source; (b) research of major interest to both NIMH and other organizations, which should be planned and funded jointly by NIMH and the other interested groups; and (c) research that is of some interest to NIMH but falls into neither of the first two categories; here NIMH would be available for technical assistance and information.

2. NIMH should constitute a child mental health research committee to allocate funds to the various research areas in consultation with the National Advisory Mental Health Council after considering the research efforts of other organizations, governmental and private.

3. The Institute should establish a child mental health coordinating center within the Office of the Director.

Aging and Mental Health

During the 1950's and early 1960's, the Institute took a major role in initiating and supporting research on the psychology and physiology of aging. When the National Institute of Child Health and Human Development was established in 1960, a large proportion of the grant applications on aging were directed to the new Institute, and the Intramural Section on Aging was later terminated.

Since 1966, the Institute's efforts in this field have been centered in the Section on Mental Health of the Aging, in the extramural program. This section has no research money of its own. Its staff stimulates research in areas where more information is needed and encourages the establishment of new service programs, which are usually exploratory or intended to serve as models. The staff also endeavors to infuse mental health considerations into programs for the aged in which these factors are neglected.

Between 1966 and the end of 1972, grants for basic behavioral research on problems related to aging amounted to about $1.1 million. Grants for clinical research came to $2.8 million. Grants for applied research, including the demonstration of services for elderly people, totaled $9.2 million.

Perhaps the Institute's most influential research project on aging was a 12-year study by intramural scientists of normal, healthy, aged men. The results of this study contradicted the popular view that the aging process is inevitably accompanied by great deterioration in psychological functioning. On the contrary, this study showed, small declines are to be expected, but severe deterioration apparently is indicative of disease, probably coupled with social isolation. Numerous studies have uncovered behavioral impairment in old people, and found it to be related to isolation, loneliness, and feelings of uselessness. These negative feelings are generated by such life changes as retirement, physical disabilities, and institutionalization. This research raises serious questions about a great number of present social policies and practices.

Other research on aging has produced important information:

• Intellectual performance among aged people varies widely from person to person, for reasons not understood. It is necessary to study the relation of mental impairment to disease processes, and also its relation to earlier environment, to education, and to current environmental conditions and stimulation.

• As individuals grow older, they show a slower reaction time as they respond to signals in their environment. Information intake and the performance of tasks, even well-learned tasks, require more effort as a person grows older. Compared with young people, older people have difficulty storing information so that they can retrieve it readily. Research is needed to explain these findings. It offers the hope that it will become possible to retard or prevent the decline in perceptual and cognitive capacities and to develop ways of increasing older people's abilities to acquire new knowledge and skills.

Psychiatric Disorders of Older People. Elderly people are particularly susceptible to organic psychosis and depression.

As discussed more fully in a preceding section, organic psychosis includes presenile and senile dementia, alcoholic psychosis, and a number of other disorders resulting from the impairment of brain tissue function. This group has been greatly neglected by researchers. Moreover, research findings are generally published in journals not likely to be read by the mental health personnel responsible for patients with organic psychosis. As one result, disorders that can be effectively treated may be confused with those that cannot.

Patients suffering from depressive psychosis are treated with antidepressant drugs, electric shock, and lithium carbonate, all of which prove effective in approximately 80 percent of the patients who receive them. However, the high incidence of suicide among older people and the frequency of withdrawal behavior testify that present knowledge about treating depression is not being applied to many people who need it.

A pertinent research finding indicates that of the people over 65 who are being admitted for the first time to a mental hospital in the United States nearly 80 percent are diagnosed as having an organic brain disorder; the rest are diagnosed as suffering from depression. In the United Kingdom, by contrast, the diagnosis of organic brain disorder accounts for only 45 percent of the first admissions in this age group.

Mental Health Services for the Elderly. Projects supported by the Institute have shown that:

• The provision of comprehensive community services can substantially reduce the number of older people admitted to State mental hospitals.

• When elderly patients are offered modern treatment programs, a significant proportion of them can be rehabilitated and can leave the institution.

• Even when organic psychosis, or chronic brain syndrome, results in severe impairment, the provision of individualized treatment and activity programs can substantially increase the well-being of old people in institutions.

• Elderly people appear to be more content and some of them live longer if they feel that the decision to live in a particular type of housing was made by them, not someone else.

Such information should be a useful guide to social policy.

Recommendations for Research on Aging

1. NIMH should join with other Institutes of Health to vigorously stimulate research on organic psychosis. NIMH should also collect and disseminate the results of recent work in this area.

2. Workers in other areas of medicine are doing research on organic psychosis, while mental health personnel are taking care of the patients afflicted by this group of disorders. NIMH should discuss this situation with the National Institute of Neurological Diseases and Stroke, the Institute of Child Health and Human Development, and the Heart and Lung Institute. The American Board of Neurology and Psychiatry should participate in the discussion because it can request a change in education or reeducation, if that is desired.

3. The Institute should encourage research on the relationship between aging and depression. It is important to know what factors prevent and what factors contribute to depression among older people.

4. NIMH should address a number of other urgent problems, including the acquisition of more information about: (a) the environmental stresses that accelerate deterioration and the environmental supports that contribute to the mental health of older people; (b) critical changes in learning processes during normal aging; and (c) biological-psychological-social interrelationships in the process of aging.

5. NIMH should coordinate its own programs to prevent or ameliorate mental health problems among elderly people, and should strive for greater coordination between its own programs and those of other Federal agencies addressed to inevitably related problems such as poverty, nutrition, housing, medical care, and retirement financing.

Research on Alcohol Abuse and Alcoholism

NIMH had sponsored relatively little research on alcohol abuse before 1966, when the President directed that the National Center for Prevention and Control of Alcoholism be established within the Institute. (The Institute's Addiction Research Center at Lexington, Kentucky, however, had been involved in the study of alcohol and sedative-hypnotic abuse and dependence since the 1950's.) During the new center's first full year of operation, research grants to non-Government scientists amounted to $2.8 million. In 1970 the center became the Division of Alcohol Abuse and Alcoholism. The next year—by Congressional and Presidential action—the division became the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Funds for research during the first full year of NIAAA operation totaled $10.2 million.

In addition to providing support for investigators across the country, NIMH-NIAAA has operated the Laboratory of Alcohol Research, at St. Elizabeths Hospital, Washington, D. C. Its annual budget for FY's 1967-1972 was roughly $5.7 million.

This report describes research findings pertaining to work supported or conducted by NIMH-NIAAA during 1967-1972.

Extent of Problem

Alcohol has long been recognized as the Nation's No. 1 drug abuse problem. In a report to Congress, NIAAA estimated that 9 million persons were alcoholics or abusers of alcohol. At least half of the more than 50,000 highway fatalities each year are alcohol related. Cirrhosis of the liver is the fourth leading cause of death among young and middle-aged urban men. The economic cost of alcohol abuse has been estimated at $15 billion a year.

Genetic Aspects of Alcoholism

Some 30 percent of the brothers and fathers of alcoholic persons are alcoholic themselves, and at least a fifth of the children of alcoholic persons develop alcoholism as adults. Alcoholism apparently "runs in families," but it is difficult to distinguish between genetic and environmental factors. Recent data from an Institute-sponsored study in Denmark indicate that children of alcoholic parents were more likely to have drinking problems than children of nonalcoholic parents, even though children and parents had been separated early in life.

Research with animals shows that different strains of mice and rats may differ in their preference for alcohol and suggests that the differences may be genetically determined. Biochemical differences among strains of mice that have markedly different preference patterns are being analyzed. The evidence to date for a genetic basis for alcoholism is not conclusive.

Biological Effects of Alcohol Abuse

About a third of the funds for alcoholism research grants have been allocated to work on the biological aspects of alcohol abuse.

Central Nervous System Function. Several investigators have been studying the effects of alcohol on the biogenic amines, such as dopamine and norepinephrine. These compounds, believed to be neurotransmitters, are now known to be affected by other drugs of abuse and by antipsychotic drugs. Findings demonstrate the need for much additional research on the interaction between alcohol and the neurotransmitters. Other research indicates that the endocrine glands may have a role in the pathological effects of alcohol. It also shows, through studies of alcohol-induced changes in the brain's electrical patterns, that alcohol profoundly affects neurophysiological events in the brain.

Metabolic Processes. Pathological consequences of alcohol appear to be somehow related to the metabolism of alcohol in the tissues, or to the effects of alcohol or its products on normal metabolic processes, or to both. Research in this area has been of good quality but narrowly focused. The most promising studies have dealt with enzymes involved in the metabolism of alcohol.

Liver Function. Damage to the liver is one of the earliest—and the most profound—consequences of excessive drinking. Such damage in alcoholics used to be attributed solely to malnutrition. Research has shown, however, that alcohol produces striking changes in the liver, even in patients whose diets are enriched in protein, minerals, and vitamins. Other

research suggests that even well-fed alcoholics have nutritional deficiencies because alcohol decreases the absorption of vitamins and other essential nutrients.

Cardiac Function. Abuse of alcohol, it is known, can lead to heart-muscle damage, and the elucidation of the mechanisms involved is being explored.

Hematology and Circulation. Alcohol is known to cause sludging and aggregations of formed elements in the blood. It seems also to decrease the lifetime of platelets and other formed elements, and it makes alcoholics more liable to hemolytic anemia. Research supported by NIMH-NIAAA has uncovered biochemical mechanisms responsible for alcohol's effects on platelets. But it has given too little attention to how alcohol affects the serum proteins of blood, which are especially important because they carry hormones that affect every organ system in man.

Biological and Behavioral Correlates of Alcoholism

Considerable intramural research has been concerned with the effects of alcohol on the behavior of alcoholic persons and with the biological correlates of such behavior.

The findings do not support the usual view that drinking dissolves the alcoholic's anxieties and produces a sense of omnipotence. Instead, during chronic drinking episodes, alcohol addicts become more and more dysphoric, anxious, and depressed, and biochemical changes occur resembling changes induced by stress.

In experimental settings, it was also found, alcoholic subjects alternate between drinking and working for tokens that can be exchanged for alcohol. Partial withdrawal symptoms do not always make for increased consumption, and no alcoholic drinks all the alcohol available. These findings, inconsistent with the notion of a craving for alcohol, seem to accord with the common-sense view that physical dependence on alcoholism is only one of the reasons an addicted person drinks.

No specific impairment of short-term memory was found either in alcoholic subjects with a history of blackouts or in control subjects—even at very high levels of alcohol in the blood.

Among other findings from intramural research: (1) during from 10 to 15 days of heavy drinking, methanol, an alcohol with poisonous metabolites, accumulates in the blood and urine, increasing as a function of time but not of alcohol dose; (2) during chronic drinking, there may be an increase in total body water rather than dehydration; (3) levels of testosterone, the male hormone, fall far below the normal range, but there is no simple relation between changes in these levels and changes in mood, and a study of alcoholics during sobriety found no relation between testosterone levels and a history of aggressive behavior.

Animal Models of Addiction to Alcohol

Animals susceptible to alcoholism are needed to facilitate both research on the addictive process and development of chemical agents for treating alcoholics. But alcoholic addiction has been difficult to produce in animals: The taste of alcohol seems to be aversive to most animals, and such factors as stress and conflict have not proved effective for producing

addictive drinking. Self-selection of alcohol by animals to the point where they are dependent on the drug has yet to be achieved. On the other hand, several kinds of animals have become addicted through the forced administration of alcohol. One result has been the development of alcohol-induced liver damage in the baboon, which has facilitated the study of alcohol's long-term effects on the liver. Nevertheless, it is still important to try to develop an animal analog in which self-administration leads to intoxication and physical dependence.

Psychosocial Aspects of Alcoholism

Something less than a third of the funds for extramural research on alcoholism has supported psychological and sociological studies. These have varied widely in subject, methods, quality, and cost.

Distribution. Survey studies at national and local levels have led to two monographs considered to be standard works on American drinking practices and problem drinking.

Etiology. Only 1 percent of the money for psychosocial research has gone to etiological studies. Currently, a major study, both longitudinal and cross-sectional, of teenagers is in process. It focuses on the development of delinquency and aggression, and on the use of alcohol and other drugs as related to socialization processes, personality factors, and social relationships.

Diagnosis. Only three grants have been awarded for diagnostic research. They were given for the development of: (1) a drinking scale based on consumption; (2) an inexpensive drinkometer; and (3) an alcoholism scale based on observations of hospitalized alcoholic patients.

The one accepted diagnostic criterion of the alcoholic person—that he is one whose drinking interferes with his functioning, on the job, at home, and as a responsible member of society—seems to have evolved from our observation of alcoholic people under treatment or on skid rows. But there may be a type of alcoholic person whose drinking *enables* him to be a responsible member of society. It seems likely that large numbers of heavy drinkers never come to the attention of researchers.

Consequences of Alcoholism. Three projects dealt with cognitive and physiological responses to alcohol in a driving simulation task. Others studied how parental alcoholism influences an adolescent's personality, behavior, and motivation to achieve and how adolescents cope with a parent's alcoholism. Well-designed studies tend to cluster about relatively minor problems; studies of more significant problems reflect some confusion in concepts and methods.

Treatment and Rehabilitation. Twenty-one projects were funded in this area. The largest investment was made in nine studies of behavior modification. Although most of these are still in progress, such factors as small sample sizes, limitation of criteria to symptom relief, and control problems suggest that the findings may be of limited usefulness.

Studies of the results of treatment demonstrate that recovery from alcoholism generally occurs only after an extended period and a series of treatment experiences. Research in progress seeks to determine the relative influence of family members and employers in identifying the alcoholic person and sustaining him or her during the course of long-term outpatient treatment programs.

It is a matter of concern that more research on the psychosocial treatment of alcoholism has not been supported. Gaps in knowledge still exist in the following areas, among others: factors affecting motivation for treatment, developmental factors promoting and sustaining early problem drinking, and the efficacy of behavior modification treatment.

Prevention. Of the two studies funded, one was to develop health education approaches for use with school children; the other, to develop a preventive intervention program concentrating on adolescents with alcohol-associated offenses. The latter study found that if such programs are to be effective, they must be started with younger children. NIAAA has established a Division of Prevention to initiate and coordinate efforts in this area.

Contracted Research on Alcoholism

In addition to the research noted, NIAAA allocated about $741,000 in FY 1972 and $1.8 million in FY 1973 for research done under contract and aimed at providing relatively quick answers to specific problems. Among the subjects under study are the relationship between alcohol and cancer, heart disease, personality, and violent crime; chemical agents to induce rapid alcohol detoxification; distinctive problems of alcohol abuse among black Americans; and the basic needs of alcoholic persons.

Recommendations for Biological Research on Alcohol

1. Efforts to learn more about the interaction between alcohol and the numerous compounds thought to be neurotransmitters should be continued. And studies should be undertaken of neurochemical systems that have been virtually ignored, including pathways of carbohydrate, amino acid, and lipid metabolism, energy-linked systems, and the electron transport chain.
2. Research on the effects of alcohol on the brain's electrical activity should be encouraged.
3. Biophysical and biochemical studies of the effects of alcohol on nerve function should be given high priority.
4. The relationship between alcohol's pathological effects and the functioning of the hormones should be vigorously investigated.
5. Research directed toward preventing or more effectively treating the medical complications of alcoholism is absolutely essential. For example, amplified support of research on liver disease is fully justified, and further studies of alcoholism-associated heart disease should be encouraged. Blood disorders that have been observed in alcoholic patients should be further studied with the best current techniques.
6. Research on the metabolism of alcohol should continue to be supported, and studies of other important metabolic processes, such as those of brain carbohydrates, lipids, and proteins, should be actively encouraged.
7. Very high priority should be given to imaginative research to determine whether or not alcoholism is inherited.
8. Since animal models of alcohol addiction would vastly facilitate research on the addictive process and its consequences and on pharmacological methods of treatment and prevention, work to develop such models should continue to receive priority.

Recommendations for Psychosocial Research on Alcohol

1. In general, psychosocial research should concentrate less on individual psychopathology and more on identifying and evaluating the social factors—including those of family, class, and ethnicity—that help determine whether or not alcohol will be abused. For example: How is drinking behavior shaped by the social environment within which it occurs? Do differences in beverage control laws affect prevalence of alcohol abuse? To what extent does alcohol use by adults become a problem as a function of changes in life situations?

2. Research on diagnosis should consider not only the problems of screening and early identification but also the broader problem of what is an alcoholic person. Among the questions needing answers: What are the routes by which people become labeled as alcoholic? What enables some heavy drinkers to remain responsible members of society?

3. More studies of the social consequences of alcohol abuse—for example, its effects on institutional efficiency and family relationships—should be undertaken.

4. Longitudinal studies, beginning early in people's lives and continued for a considerable time, should be supported as sources of invaluable information on numerous aspects of alcohol abuse.

5. Research on treatment should seek to learn which approach works best with what types of people.

Administrative Changes to Facilitate Research on Alcoholism

1. A research contracts review board should be established to encourage and initiate research contracts and provide advice on contract proposals.

2. When a member departs from an initial review group, formal recommendation of a number of persons qualified to succeed should be made by the group.

3. Projects contained within a request for support as a research center should be evaluated individually.

4. In order to develop research manpower in the field of alcoholism, NIAAA should take a number of actions, including establishment of: (a) a Senior Scientist Award; (b) fellowships to support predoctoral and postdoctoral training; and (c) scientific achievement awards for best published studies in areas relating to alcoholism.

5. A Center for Advanced Studies on Alcoholism should be established.

6. The Intramural Research Program should be continued, strengthened, and subjected to periodic scrutiny comparable to that given extramural grant applications.

7. In the interest of improving the evaluation and communication of research activities and results: (a) an annual report describing all research support should be made available to the public; (b) an annual review of alcoholism research should be disseminated to all interested scientists; (c) a compendium of outstanding research papers, drawn from the best journals, should be published quarterly.

Research on Drug Abuse

· Drug abuse was the first research topic to receive NIMH support, and the amount of that support has grown tremendously—particularly in the extramural program.

Funding of the Addiction Research Center (ARC) at Lexington, Kentucky, rose from $51,000 in 1948 to $1.77 million in 1972, an average rate of increase for a year of almost 16 percent. However, extramural support of research related to drug abuse stood at $75,000 in 1961 and at almost $21 million in 1973, an average annual rate of increase of 60 percent. In 1973, such support accounted for one-quarter of all extramural funds for research.

Epidemiological Studies

When the NIMH Center for Studies of Narcotic and Drug Abuse (now the National Institute on Drug Abuse) was established in 1967, there was scant information on the extent of drug abuse. In response to public concern, NIMH focused its first surveys on the drug use of students. Definitive epidemiological studies to give a well-rounded picture of the problems are just now getting underway. Highlights of what is known, usually as the result of NIMH-sponsored surveys, are given in the following paragraphs.

Opiates. It is estimated that about half a million people in the United States are opiate users and addicts, the opiate generally being heroin. Most are young men of minority status and low income, living in urban areas. Many may not use heroin frequently enough to become addicted. Nevertheless, the annual cost of opiate abuse—including losses caused by criminal activity, the costs of law enforcement and treatment efforts, and loss of the addicts' economic productivity—is estimated at well over $6 billion.

Marihuana. According to estimates by the National Commission on Marihuana and Drug Abuse in 1972, close to 25 million Americans had used this drug at some time, and 8 million were then using it. A survey of persons aged 18–29 showed that 37 percent of respondents from the Western section had used marihuana; this was about three times the proportion of users elsewhere in the country. A survey of persons aged 12–17 showed that the proportion who had ever used marihuana was at least as high as in the older group. Marihuana use is related statistically to both the use and the extent of use of most other drugs. Much more deviant and illegal activity has been found among teenagers who have used both marihuana and other drugs than among those who have used only marihuana. There is little evidence that marihuana use in itself causes lawless behavior.

Hallucinogens. Less than 5 percent of the general population of age 12 and older have used lysergic acid diethylamide (LSD) or other hallucinogens. Among college and senior high school students, one in seven has used these drugs, typically only once. Use has been concentrated most heavily among middle-class and upper-class young people.

Stimulants. In this classification, the drugs mainly abused are the amphetamines and cocaine. Over the last 25 years, epidemics of amphetamine abuse have appeared in several countries, including the United States, where amphetamine abuse reached a peak between 1965 and 1969. No ade-

quate prevalence figures exist. People abusing amphetamines have included housewives for whom the drugs were initially prescribed for weight reduction; business and professional men, students, and truck drivers, relying on amphetamines for their antifatigue effects; and people taking them for a "high." Recent years have seen a resurgence in the use of cocaine. This drug seems to be particularly popular among narcotic addicts in methadone maintenance programs.

Depressants. Among these, the short-acting barbiturates and a few nonbarbiturate compounds are those usually sought for nonmedical use. Like alcohol, they have widespread lawful use, and they produce sedative-hypnotic effects; but they are much more potent than alcohol. Depressants are the most often prescribed class of drugs. One survey found that roughly one in twelve adults used them at least six times a month. The proportion of medically sanctioned use that actually constitutes abuse is probably quite small. Still, depressants are the chosen means for at least 2,000 suicides a year.

Biological and Psychosocial Research

In one especially important though undramatic development, the Institute has worked with the Food and Drug Administration to expedite approval of research proposals and to supply investigators with the commercially unavailable drugs—marihuana, heroin, hallucinogens—required for research. By the spring of 1973, drugs had been supplied for more than 750 research projects.

NIMH investigators at the Addiction Research Center (Lexington) and in the Washington area have found that most drugs of abuse alter in one way or another the activity of neurotransmitters in the brain, as do compounds used to treat schizophrenia and depression.

Opiates. Considerably more has been learned about addiction to opiates—in this country mainly heroin and other narcotic analgesics—than addiction to other drugs. One major reason is the work of the Addiction Research Center, which began its activities 15 years before the founding of NIMH.

Among its notable accomplishments, ARC research has: (1) demonstrated that the abstinence or withdrawal syndrome is a manifestation of physical dependence on the drug, subtle evidence of which may persist for months; (2) shown that the syndrome can be conditioned in both animals and humans; and (3) found evidence that both conditioning and protracted abstinence may help explain the behavior of hospital-treated addicts who are returned to the community without treatment and strict guidance there. Typically, these persons soon relapse—perhaps, it now seems, because they were conditioned to use opiates under the circumstances to which they have returned and also because in that environment they may experience withdrawal symptoms.

Both the timing of the onset and the severity of withdrawal symptoms are closely related to the rate at which the opiate is metabolized. Heroin's action lasts from 3 to 6 hours. The observation that methadone, a synthetic opiate, is inactivated much more slowly led ARC scientists in the 1940's to suggest that methadone might be useful for treating opiate addiction.

They also found that experimental addiction can be prevented by treatment beforehand with opiate antagonists, pharmacological agents that block the same receptor sites of nerve cells as opiates.

ARC or other units of the Institute have also developed:

- Improved methods for detecting opiates in body fluids.
- A program for assessing the abuse potential of drugs proposed for use as analgesics. As a result, during the last quarter-century no narcotic analgesic having any substantial abuse potential has come into uncontrolled use.
- A set of personality tests, known as the Addiction Research Center inventory, to help study the psychopathology and personality of addicted persons and their subjective reactions to drugs. (The most generally agreed-upon characteristic of addicts who have been studied is antisocial aggression. Another finding: during chronic opiate use, there is less than normal motivation for physical, mental, social, and sexual activities.)

Marihuana. Work under the auspices of the Institute has described the clinical syndromes resulting from various doses of this drug. In the usual pattern, there is stimulation and euphoria, followed by sedation and tranquility, and, with higher doses, sleep. This research has led also to the identification and synthesis of what appears to be the drug's most important component: tetrahydrocannobinal (THC). In large experimental doses, THC is a hallucinogen, but there is no cross tolerance to other hallucinogens, and there are some differences in physiological effects. Some of the drug's action may be caused by breakdown products. Addiction does not occur, and studies to date have not documented harmful effects from long-term use.

Hallucinogens. These compounds, of which LSD is the most widely known and used, began attracting research interest in the early 1950's because of their psychosis-like effects and their chemical similarity to norepinephrine and serotonin, brain chemicals now identified as important neurotransmitters. A number of investigators thought it might be fruitful to study schizophrenia through an experimental, drug-induced psychosis; others were interested in learning whether or not a naturally occurring brain chemical or a metabolite of it could in certain cases become transformed into a hallucinogen.

Early work in the intramural program and at ARC uncovered much useful information about the nature, structure, metabolism, and effects of the hallucinogens but shed little light on schizophrenia. More recent studies, though, have shown that tryptamine, a naturally occurring compound in the centarl nervous system, produces many of the same effects as LSD. Because of this and related findings, the hypothesis that man himself under certain circumstances may produce dangerous hallucinogens remains alive.

Addiction to the hallucinogens, so far as is known, does not occur. Nor does death from overdose. Street people who use LSD show more chromosomal changes, and probably more spontaneous abortions, than controls—for reasons that may not be attributable to the drug itself. LSD users do not fit into any psychiatric category. Attempts by investigators over the years to use LSD as an adjunct to psychotherapy or as a special type of psychotherapeutic intervention have not clearly demonstrated therapeutic value. Whether or not prolonged use of LSD can permanently impair brain function is not known.

Stimulants. Case reports, clinical studies, and laboratory studies with animals have all demonstrated that the amphetamines and other psychomotor stimulants are highly addictive, perhaps as much so as the narcotics. Many animals will continue to give themselves injections of amphetamines until they die. In humans, addition may occur within a few months. The effects of prolonged use on general health are not known.

ARC scientists in 1944 carried out probably the first experimental study of chronic amphetamine intoxication in man and the first demonstration of amphetamine psychosis. This psychosis, which often accompanies amphetamine intoxication and is easily reproduced experimentally, holds research interest as a possible model for paranoid schizophrenia.

Psychosocial research points to the possibility that the amphetamines, along with the opiates, are particularly attractive to psychopathic individuals.

Depressants. Research conducted or sponsored by NIMH has demonstrated that the sedative effects of these drugs probably results mainly from depressant action on the midbrain reticular activating system, and that overdose deaths result from depression of the brain's respiratory center and of the cough and swallowing reflexes. Continued abuse of either the barbiturates or alcohol leads to addiction.

Research on Prevention of Drug Abuse

Much time, money, and effort have been spent in recent years in programs—usually of an education and information nature—to prevent drug abuse. But little attempt has been made to assess the impact of such work. Unless preventive efforts can be carefully evaluated, it is difficult to justify the continuance of present expenditures. Such efforts will have to be directed toward more specific goals than "curbing drug abuse" so that progress can be measured and the programs evaluated.

Research on Treatment of Drug Abuse

NIMH has pioneered in most of the research on drug abuse chemotherapy. In the 1940's, ARC scientists proposed the use of methadone for detoxifying morphine and heroin addicts, though it was another 20 years before methadone was first used as a maintenance drug, with a small group of patients in New York. In 1972 an estimated 50,000 persons were in methadone maintenance programs. A number of Institute-supported investigators are studying various biological and psychosocial aspects of long-term methadone maintenance, among them the problem of neonatal addiction. Others are evaluating the clinical usefulness of a related but longer acting compound, l-alphaacetylmethadol (LAAM).

The narcotic antagonists, which block the euphoria induced by the opiates and thus discourage their use, are of far greater potential value than maintenance drugs. The use of antagonists for the treatment of heroin dependence was first proposed by scientists at ARC, and pharmacological studies defining their properties in man and their potential treatment were first conducted at ARC. Research has confirmed that the first antagonist, cyclazocine, can be a useful tool in treating the addict. A new compound, naltrexone, has longer action and may prove to be significantly better. For several years, ARC also has been evaluating depot forms of

antagonists, intended to provide antiopiate action over a long period and thus eliminate the drawbacks associated with the need for daily treatment. Research with animals points to the feasibility of a preparation that releases naltrexone in effective levels for about a month.

In further research on treatment, the Institute:

- Has developed a contract program to speed the production and testing of narcotic antagonists.
- Encourages research leading to the development of possible antagonists to the amphetamines and other abused drugs in addition to the opiates.
- Supports research on: (1) immunoassay techniques, which have considerable promise as highly sensitive indicators of drug use, and (2) the possibility that people can be immunized against the effects of opiates or that the receptor sites on brain nerve cells for drugs of abuse can be blocked or inactivated.
- Supports research on behavior modification approaches to treatment.
- Has established systems that collect data from Institute-supported treatment programs in an attempt to gauge the relative success of different treatment techniques, and is fostering studies that use more rigorous research methods, including followups of patients after they have completed treatment or dropped out.

Need for Greater Support of Research on Drug Abuse

Expenditures for research on drug abuse are dwarfed by expenditures for treatment, education, and training. A substantial increase in the support for research would significantly strengthen the other programs.

Recommendations Pertaining to All Drugs of Abuse Except Alcohol

1. Immunological approaches to the detection and possible treatment of drug abusers should continue to be supported.
2. The development of behavior modification approaches to the treatment of drug abuse should be encouraged.
3. Anthropological research should be undertaken to determine social and cultural factors that allow some societies to control drug use and prevent serious abuse.
4. Epidemiological research should be encouraged, with emphasis on the extent, patterns, and trends of drug abuse among ethnic and racial groups, among children and youth, and in industrial settings—and on the people in these populations who do not become drug abusers. Such research may point to the factors that protect some young people from serious drug involvement even though they are part of a group at high risk.

Recommendations Pertaining to Specific Drugs

1. Research on the efficacy of narcotic antagonists in programs of extended treatment should be continued.
2. The possible role of narcotic antagonists in the *prevention* of addiction in high-risk populations should be explored.
3. The effect of prolonged use of methadone, the interaction of methadone with other commonly used drugs, and the effects of long abstinence

after the use of methadone has stopped should be examined in more detail. The effectiveness of methadone programs should be compared with that of other forms of treatment.

4. Studies of long-term marihuana users both here and abroad should be continued and expanded. Special attention should be paid to the effects of marihuana on females. Carcinogenicity of marihuana should be investigated, particularly because, like tobacco, the drug is typically smoked, with deep inhalation. Psychological tests should be developed for application in countries where marihuana has long been commonly used, in order to determine the possible effects on brain function.

5. The routes and products of the metabolism of marihuana should be further investigated, and the actions of various marihuana constituents and metabolites ascertained.

6. The behavioral effects of marihuana at the usual range of single doses have been adequately investigated, but further studies of the mechanism underlying these effects are needed.

7. Marihuana effects of possible clinical importance should be studied. These include the lowering of intraocular pressure, the impairment of glucose tolerance, and the effects on pulmonary and cardiovascular function.

8. Because of the close relationships between depressants and alcohol—at the pharmacological, epidemiological, clinical, and therapeutic levels—coordinated research on these drugs of abuse should be encouraged.

9. Studies of amphetamine psychoses are important in understanding central nervous system mechanisms in the development of psychoses and should be continued.

10. Pharmacological investigations of cocaine should be undertaken.

11. Basic research on the pharmacology and action of hallucinogens, which hold great potential as a tool for increasing our knowledge of brain functions, should be encouraged.

12. Among other research projects that should be encouraged are: (a) a study of former heavy LSD users; (b) studies of brain function and possible chromosomal damage in patients who have received LSD therapeutically; (c) a scientific study of hallucinogen-caused "mystical" experiences, which might increase our understanding both of brain mechanisms involved in such experiences and of belief and value systems as related to the development of drug cults.

General Recommendations for Research on Drugs, Including Alcohol

1. In biological areas, high priority should be given to: (a) basic research, with particular attention to the study of the effects of drugs on the central nervous system; the development of more effective chemotherapy depends upon the success of such research; (b) studies of the interactive effects of drugs commonly taken together, including tobacco and over-the-counter and prescription drugs; and (c) imaginative approaches to studies of the genetic aspects of addiction.

2. In psychosocial areas, priority should go to efforts to identify and explain the forces, including attitudes of parents and peers, that influence the development of drug abuse (and not to studies of individual psychopathology). Longitudinal studies of drug abuse are needed to show how it occurs in relation to normal processes of development and change. The

findings should increase our present sparse knowledge of how to prevent drug abuse.

3. In research on treatment, evaluation studies should have high priority.

Organizational Change to Facilitate Drug Abuse Research

An intramural facility should be established for treating—and doing research on—drug abuse and addiction. The need for such a facility is particularly urgent because the Clinical Research Center, Lexington, has been closed.

Research on Social Problems

A Review of Developments in the Field

Twenty-five years ago, social problems were seen primarily as arising from the presumed deficits and pathologies of the people who manifested socially undesirable behavior. Efforts to understand such behavior were focused on the individuals in whom it appeared, as were efforts toward prevention and treatment. Moreover, findings from research on individuals within a narrow segment of the population, such as prisoners or people under treatment for drug addiction, were often used to describe a much larger and more heterogeneous population, such as all criminals or all drug users.

To a considerable extent, this situation obtains even today. Increasingly, however, leading investigators have come to view social problems as the product of complex interrelationships among the individual, his social environment, and the structure and institutions of society. To a much greater degree than formerly, social problems are seen as residing not so much in the individual as in the forces surrounding him. The move is away from the study of the person caught up in the problem—the criminal, the alcoholic, the poverty-stricken—to the study of conditions involved in the genesis and the possible remedy of the problem. Perhaps even more important is the increasing recognition that social problems appear to have common sequences and may indeed have some common causes.

This change in perspective can be demonstrated in every major field of social problems research. In research on race relations, for instance, it was still held not long ago that discriminatory behavior simply reflected prejudiced attitudes. Consequently, researchers in the field were mainly interested in devising tests of prejudice and in unraveling its psychodynamics. Then it was learned that most discrimination results not from blatant bigotry but from the ordinary behavior of people who are simply following standard institutional practices. Accordingly, researchers have shifted increasingly to the study of ways in which social, economic, and political systems influence behavior, and of the processes by which individuals and social institutions change.

Not long ago, too, research on poverty reflected the belief of many investigators that poor people were kept at the lower socioeconomic levels by the "culture of poverty." It has come to be recognized, however, that the values and attitudes of the poor represent adaptation to a set of social and

economic conditions, and that movement out of poverty depends on changes in social structure rather than in individual attitudes. Hence, research has progressed to an examination of such factors.

Similarly, social scientists have come to recognize that criminality is rooted not only in personality but also in many other factors, including biological potential, experiences, situational exigency, and place in the social structure. Moreover, the very process by which a person is labeled a delinquent or a criminal can profoundly affect his whole future life. With this broadening of research perspective has come a tendency to question the system of criminal justice and to analyze both its rationale and its operation.

Research on sex roles, except in a few notable early studies of cultural variations in sex-role differentiation, generally focused on describing psychological differences between American men and women, as shown by tests and experimental situations with subjects who were almost always white and middle class. Little effort was made to delineate subcultural differences even within white, middle-class America. Insofar as these studies went beyond describing performance on tests or behavior in experimental situations, they almost invariably focused on behavior within the family. Research that transcended mere description focused on socialization processes—to answer the question of how girls (or boys) learned their appropriate adult sex roles.

From description of existing sex-role differences in middle-class America, research has turned to comparative study, across cultures, social structures, and historical epochs, of the many possible arrangements known to human society—some emphasizing, some minimizing sex differences. The findings illustrate that a large array of human potentialities can be seized upon by one society or another as sexually differentiating behavioral characteristics. Thus, sex-role research has gone far beyond the family, to sex-role differentiation in other spheres of life, notably occupational, educational, political, and recreational. In what may be the most profound shift of all, the focus is changing from description of sex-role differentiation to analysis of its historical and social structural bases.

Conceptual Commonalities

An increasing recognition of the apparent interconnectedness of social problems in their consequences and possibly in their underlying conditions has great importance for this research field. Each area of social problems research has tended to be an island unto itself: People in one area of social problems often did not read the research literature in other areas. Most research attention used to be focused on the specifics of some given social problem, such as juvenile delinquency, discrimination, or mental disorder, with relatively little search for common conditions underlying a variety of social problems. It is not surprising that the greatest achievements of that era of research were descriptive: We have come to know the phenomena of many social problems and to understand their manifestations. However, each problem was studied as if unique. Investigators in different areas of social problems research sometimes found the same variables to

be involved but often failed to notice the commonalities. For example, it was the students of social stratification, not the students of mental disorder or drugs or criminality, who noticed the ubiquitous importance of social class for these and other social problems.

Another fundamental change has been the growing recognition that one of the most serious errors to be avoided, in determining the focus of research, is the confusion of *labels* with *conceptual relevance*. It is now recognized that a study of alcoholics, schizophrenics, or criminals is not necessarily relevant to our understanding of social problems. Relevance, or lack of relevance, depends upon the adequacy of conceptualization of the research. Conversely, the fact that a study does not focus on any of these problem populations does not necessarily indicate that it is irrelevant to social problems research. The study may indeed be irrelevant, but it may also be broadly relevant for a range of social problems and should not be judged by superficial labels. Social problems research has increasingly emphasized research with conceptual relevance for understanding factors basic to the prevention or amelioration of social problems, rather than just studies of people designated as having (or causing) some particular social problem.

A Review of NIMH-Supported Social Problems Research

In 3 recent fiscal years, the Institute supported approximately 220 research projects on social problems (other than mental disorder, alcoholism, and drug addiction). Close to 50 percent of the projects were concerned with treatment and amelioration; close to 40 percent, with descriptions of the problems or their consequences. The remainder were divided about equally between theoretical or methodological studies and studies of causes and underlying conditions.

Further analysis of the NIMH-supported research on amelioration shows that much of it has been based, explicitly or implicitly, on the belief that the problems are essentially individual and psychological; the remedy, therefore, is to be sought in some form of therapy for the affected individuals. There has been little real experimentation. Evaluations of remedial programs have been relatively rare and, when undertaken, often rather limited in focus and less than fully objective in method. The evaluators have too often been the program initiators themselves, and the studies only infrequently have included the clients or affected populations.

NIMH has supported impressive descriptive research on the phenomenology of various social problems and their consequences. But this research has largely focused on the full-blown manifestations of particular social problems. It has been interested mainly in their psychological consequences and has paid little attention to the social contexts in which they occur and within which society attempts to deal with them.

Even etiological research has been rather limited in focus—little of it dealing with interactions of biological, psychological, and social conditions, and most of it limited to the psychological level of analysis. The social has been largely ignored, and only a rare study has been con-

cerned with identifying common conditions underlying a range of social problems.

Evaluation of Institute's Core Ongoing Programs

Since the Institute's specialized programs on mental disorder, alcohol, and drugs are discussed in other chapters, attention here is confined to programs on other social problems or pertinent to social problems in general. These programs have been small in scale and undersupported in staff, funds, and in some cases, administration. Nevertheless, they have made some important contributions. Judged against the field of social problems research as a whole, or against the Institute's own programs in other research areas, these programs have been miniscule. However, they show that where the Institute has tried to develop programs of thoughtfully planned—even though modest—research in areas of direct pertinence to social problems, it has succeeded. Moreover, there are several successful "models" of NIMH endeavor in social problems research, which could well serve as a basis for future development. One is the problem-oriented center. Among the best organized of these centers are those concerned with crime and delinquency, urban problems, and minorities. A second model is provided by the Institute's Mental Health Study Center; a third, by the Laboratory of Environmental Studies in the intramural program.

Major Substantive Recommendations for Social Problems Research

The recommendations are based on the following premises:

- Most current research on social problems has serious deficits: (1) too little emphasis on underlying conditions, on the interplay of social, psychological, and biological factors, and on the processes of social change; (2) lack of attention to the probability that social problems have causal factors in common; (3) too little concern with evaluating ameliorative programs; and (4) too little attention to the institutional constraints on the utilization of research.
- Social problems by definition are more than the expression of individual psychopathology.
- Many social problems are interrelated.
- As a specialized research institution, NIMH is better equipped to sponsor and conduct research on some types of social problems than on others.

The recommendations are also based on the conviction that the Institute, to be as constructive as possible in its support of social problems research, cannot simply rely on choosing the best of the research applications received; it must also help improve the level and scope of conceptualization of research in this field. The recommendations are intended to provide some of the needed guidelines to this end.

In planning and supporting research on social problems, NIMH should emphasize:

1. *Better measures of social problems.* There is an overriding need for methodological research. Particularly acute is the need to detect

changes in social conditions in order to provide adequate data for evaluating ameliorative policies and programs. Among other needs are better measures of indicators of social strain.

2. *Research on the psychological impact of social structure.* Many social problems of great concern to NIMH—including schizophrenia, heroin addiction, and many types of criminal behavior—occur disproportionately among lower class populations. Hence, greater emphasis must be given to research on the psychological and behavioral concomitants of social position, particularly to studies designed to unravel the processes by which social position makes its psychological impact.

3. *Analyses of social and individual change.* Research on social change requires repeated or continuing observation of some institution, locale, or situation during periods of major transition. Its probable payoffs include information on: (a) how changes in social structure bring changes in people's values and behavior; (b) which factors facilitate and which inhibit social change; and (c) what steps, if any, should be taken to ameliorate the effects of change. Research on individual change would help elucidate the processes by which social conditions affect psychological functioning.

4. *Analysis of the interaction of social, psychological, and biological conditions.* Perhaps many social problems arise from the joint occurrence or interaction of social, psychological, and biological variables, some or all of which might not be important except in the presence of others. Perhaps different constellations of variables lead to different outcomes—one group of them to schizophrenia, perhaps; another to criminality; a third, to overcompensatory efforts toward achievement.

5. *Cross-national research.* Well-designed, cross-national comparative studies can be invaluable in determining whether the results of research on social problems and their prevention and treatment are universally true, or true only under the social and cultural conditions of the country where the research was conducted.

6. *Research on the organization of remedial programs.* Studies are needed that: (a) show why current organizations and institutions fail to remedy problems; (b) determine what common issues emerge in different types of institutions as they attempt to develop effective treatment programs; and (c) identify critical decision-making points in different service systems and the consequences of both effective and ineffective action at those points.

7. *Social experimentation.* The definitive way to test assumptions about the usefulness of proposals for alleviating social problems is to put the assumptions to experimental test. Some basic factors must be considered: (a) most proposals for alleviating social problems are based on untested assumptions about the motivations of the people to be helped, and the way these motivations will be affected by the measures proposed; these assumptions must be made explicit and tested empirically; (b) social experimentation should be included in the design of new social programs; (c) rigorous evaluation of social programs should ask, among other questions, which procedures worked well and which did not, in whose hands, and for which segments of the population; (d) programs in diverse areas should be compared for commonalities, so that what is learned about the reasons for success or failure may be carried over from programs

dealing with one social problem to programs dealing with others; (e) efforts should be made to determine how programs in one sector affect problems in others—for example, how programs dealing with truancy in the educational system ultimately affect the juvenile and criminal justice system.

Major Recommendations for Organizing and Funding Social Problems Research

1. The Institute should broaden the base of those responsible for stimulating, approving, and administering social problems research. Specifically, NIMH should recruit ad hoc consultants from the groups that are most affected by social problems as well as from among academic and political professionals.

2. The Institute should explicity recognize the need for, and take steps to achieve, coordinated research efforts across organizational boundaries within NIMH and between NIMH and allied agencies. The Institute should: (a) arrange, insofar as possible, to have all heads of units concerned with social problems research report to a higher official charged with seeing that the research programs are mutually reinforcing; (b) tax each unit responsible for research on any social problem a proportion of its resources—perhaps 10 percent of its personnel budget—to support research on the interrelationships among social problems and on the common conditions underlying social problems; (c) develop seminar programs and information exchanges for all units dealing with social problems research; (d) strengthen ties with policy-making sectors of Government and be responsive to their research needs.

3. NIMH should maintain the present intramural research program and establish smaller intramural research components—or continue those already established—in other divisions of the Institute. To bridge gaps between the intramural and extramural research programs, NIMH should develop: (a) flexible arrangements for scientists in one program to work for agreed-upon periods of time in the other; and (b) greater flexibility in the use of intramural facilities—and sometimes personnel—for research of high priority to other parts of the Institute.

4. The Institute should make every effort to obtain greater resources for social problems research. It should allocate resources in accordance with program objectives and priorities rather than by organizational units.

5. The Institute should work for increased flexibility in the use of existing mechanisms of research support. Specifically, it should: (a) make readily available both regular and special grant mechanisms for stimulating and carrying out fundamental research of special pertinence to social problems; (b) use the contract mechanism more effectively by, among other actions, easing the restrictions that now make it difficult to use *grant funds* for purposes best accomplished by contracts, and *contract funds* for purposes best accomplished by grants; and (c) use existing mechanisms in combination—for example, the intramural research mechanism to conduct longitudinal studies and the contract mechanism to carry out the periodic field work required in such research.

Research on the Treatment of Mental Disorders and Emotional Disturbances

During the last 25 years, NIMH-supported research has developed, tested, and refined new and powerful treatments effective for a wide spectrum of emotional disorders. The techniques include chemotherapy, behavior therapy, and physical manipulation. The advances have occurred in the context of a field in flux—a field stimulated by continuing debate regarding such issues as the appropriate model for conceptualizing psychological illness and health; who or what needs "treating"; the specific and general mechanisms for affecting such changes; and the qualifications prerequisite for the practice of the ever-multiplying forms of psychosocial treatment.

Psychosocial Treatment

The psychotherapies attempt to effect change in thought, mood, and behavior through verbal and symbolic techniques brought about by a professional relationship between a socially sanctioned healer and a suffering person.

An impressive roster of investigators have received NIMH support on psychosocial forms of treatment—almost every major researcher in the field of psychotherapy and behavioral intervention. The extramural projects funded since 1947 number 328, many of which have continued for as long as a dozen years. Nonetheless, only about $40.3 million has been spent on all forms of psychosocial treatment.

It was allocated as follows:

Individual psychotherapy, 98 studies, $10.2 million
Behavior therapy, 95 studies, $13.9 million
Group therapy, 73 studies, $6.1 million
Specialized therapies (such as art, hypnosis, self-conducted), 42 studies, $7.1 million
Psychoanalysis, 20 studies, $2.9 million

The total represents 5 percent of all NIMH research grant expenditures over the last 25 years.

The intramural research program has contributed importantly to the development of family therapy and ward milieu treatment, particularly in treatment of schizophrenia.

In addition to supporting basic and clinical research, the NIMH staff joined with the American Psychological Association to sponsor three national conferences on research in psychotherapy. The three volumes that emerged from these have become useful texts for researchers and trainees. Also, the Clinical Research Branch has conducted a critical review of research findings and has sponsored a survey of effective measures of change. The resulting publications, together with a conference report on the planning and conduct of research on the effectiveness of psychotherapy, have provided valuable guides to the researcher.

Although behavior therapy, along with most somatic approaches to treatment, is derived from a tradition of experimental research, this is not the case with the other main psychosocial therapies. Initially, investigators of psychotherapy had to overcome a pervasive belief that rigorous research might interfere with the very process and consequences of the

treatment to be studied. Therapists feared that the richness and complexities of the concepts of psychodynamics and psychopathology, and the goal of reintegrating personality structures, did not readily translate into operational terms or measurement by simple instruments. Resistance to the data-gathering techniques of audio and visual recordings has diminished, but there is still a problem of specifying the target and nature of treatment, relevant therapist and environmental variables, and measures of change and treatment outcome.

Classical conceptions of psychoanalysis and psychodynamic therapy were, of course, seminal in the history of treatment for mental illness and emotional disturbances, but they have been resistant to scientific examination and verification. In consequence, the number and proportion of research projects supported in the area of psychotherapy have declined steadily over the years, while the number and proportion in behavioral intervention research have increased. Support of behavior therapy research now exceeds that of other psychosocial treatments. However, the support of clinical research on the somatic therapies, particularly chemotherapy, continues to exceed the support of behavior therapy and psychotherapy combined.

Research on Outcome of Psychotherapy. Research findings on the outcome of treatment and variables affecting the outcome can be summarized as follows:

- Most forms of psychotherapy are effective with about two-thirds of nonpsychotic patients. About 10 percent of treated patients become worse.
- Controlled research has been notably successful in demonstrating that treated patients show significantly more behavioral and attitude change than untreated patients.
- Any seeming differential effectiveness of various forms of psychotherapy gradually disappears with the passage of time. It has yet to be convincingly demonstrated that one form of psychotherapy is superior to another.
- The spontaneous remission rate is far lower than the 72 percent widely believed, but must be calibrated for each homogeneous patient population treated.
- Patients who benefit from psychotherapy are those who experience acute discomfort because of their condition and are highly motivated to receive treatment and expect to be helped by it. They show a high degree of personal integration, are intelligent and reasonably well-educated, have achieved some social success, are reflective, and are able to experience and express emotion.
- The characteristics of the effective therapist remain unclear. The currently popular belief that an effective therapist need only be genuine, emphatic, and warm is not supported by recent research.
- The therapist-patient interaction is a mutual influence process. The patient may seriously limit or enhance the therapist's ability to function in the manner he believes to be useful; similarly, the therapist's behavior may limit or enhance the patient's ability or willingness to deal with his or her problems.

Research on the Process of Psychotherapy. Systems have been developed for the analysis of the verbal content of patient-therapist inter-

actions. A variety of scales and indices describe social alienation, personal disorganization, motives, the direction of hostility, the patterning of patient resistance, therapist activity level, phases of treatment, levels of patient experience, and other factors.

Linguistic and paralinguistic analyses, including studies of speech disturbances, were undertaken to provide an index of moment-to-moment changes in patients. Patterns of body movements were studied for their potential communication value as a possible means of improving clinical judgment. Repeated efforts have been made to relate physiological changes in patients to events occurring in the course of psychotherapy.

The findings of research on process are difficult to summarize or interpret. In part this is because: (1) instruments to study process have not yet been widely used; (2) the particular questions and conditions studied by one investigator have not usually been studied by others; and (3) the conditions that obtained in a given study are difficult to replicate. Thus, the stability of the findings is usually unknown, and it is unclear to what extent such findings can be generalized to therapy.

New Treatment Techniques. Within the last decade, particularly, there has been a proliferation of new psychosocial treatment techniques—many of them, in one form or another, ages old. They include transcendental mediation, encounter groups and other techniques of the human growth movement, primal therapy, reevaluative counseling, the Arica Institute system, and others. They are described in Chapter 12 of the report.

Research on the new methods has been relatively neglected—in part, at least, because the avant garde practitioners do not apply for research support and because competent investigators rarely can obtain the cooperation of practitioners. One notable exception was a study of 10 different encounter group approaches. Here the investigators found that about a third of the participants in the groups benefited, another third remained unchanged, and the remaining third had a negative outcome. In this latter group, about 9 percent suffered serious damage.

A second exception was work supported by NIMH on transcendental meditation. One study found that meditation induces relaxation, accompanied by physiological changes differing from those during sleep and hypnotic trance. According to a survey of college students, consistent use of this technique was associated with less use of drugs. The claims for transcendental meditation include increased energy and better general health, and are worthy of systematic research.

Behavior Therapy

Behavior therapy is differentiated from other forms of psychosocial treatment in that its philosophy and techniques are derived principally from laboratory research on classical and operant conditioning. A wide range of specific interventions has been developed to alter observable "maladaptive" behavior and to manipulate systematically the conditions believed to evoke or maintain such behavior. Grants for research on behavior therapy represented 31 percent of the total support for psychotherapy research in 1967 but 50 percent or more in 1970. Simultaneously,

the share of the research dollar going to individual and group psychotherapy has declined.

The principal results of research on behavior therapy are summarized below:

- Systematic desensitization has been reported to be highly effective with most phobic and anxiety reactions, but to be somewhat less effective with obsessive-compulsive behavior, hysteria, encopresis, psychological impotence, frigidity, homosexuality, fetishes, transvestism, exhibitionism, gambling, obesity, anorexia, insomnia, and nightmares.
- Operant conditioning principles have been successfully applied for the modification of such behavior problems as temper tantrums, head banging, thumb-sucking, and refusal to eat.
- Forms of reinforcement therapy, or operant conditioning, have been succesfully applied in institutions to alter verbal and nonverbal behavior of psychotic adults and autistic children. The techniques have also been adapted to natural community settings—the home, school, halfway house, community agency—to deal with a wide range of problems, such as "excessive verbal demands," rebellious behavior, sibling rivalry, hyperactivity, isolate behavior, difficulties in relationships with peers, and classroom disruptions.
- Behavior therapy approaches to problems of alcoholism, other drug addictions, and smoking have not yet been perfected.
- Behavior therapy is not usually undertaken with "quasiphilosophical," existential problems of anomie, ennui, and the meaning of life, or other forms of existential crises, unless specific behavior problems can be discerned.

Somatic Therapy

Somatic treatment approaches are based on the belief that psychological conditions can be influenced therapeutically by nonpsychological methods. These approaches include chemical, hormonal, and physical interventions that directly or indirectly affect the nervous system and produce changes in thought, mood, and behavior.

NIMH support of somatic treatment techniques falls into two general areas: basic biological research and studies of specific treatment techniques.

Basic biological research has included the study of: (1) pharmacological properties of new compounds; (2) physiological and behavioral effects of drugs on animal and human subjects; (3) the synthesis, storage, release, and metabolism of central nervous system transmitters; (4) the anatomical, physiological, and biochemical bases of various emotional and pathological states; (5) the biology of memory; and (6) the role of the endocrine system in the regulation of homeostasis and adaptive behavior.

Drug Treatment of Mental Disorders. Before the discovery of psychotropic drugs, available psychoactive chemicals primarily aided the hospital management, rather than the treatment, of patients with schizophrenia or disabling depressions. Today, most schizophrenics and people suffering serious affective disorders can be quickly returned to their families or cared for in halfway houses or foster homes. Consequently, the focus has shifted from concern with terminating acute or chronic psychotic episodes

to concern with prophylaxis, reduction of the side-effects of prolonged chemotherapy, and problems of maintaining the individual as an effectively functioning member of the community.

Psychotropic drugs do not provide a cure for psychoses, but they do appear to interrupt the psychotic episode and to ameliorate symptoms. Drugs also offer a significant prophylaxis by preventing the recurrence of symptoms that in the past resulted in frequent rehospitalization. While the Institute played no significant role in the discovery of these drugs, it has been a major influence in the early clinical testing of their efficacy and safety. Since the time of the first psychotropic drugs, chlorpromazine and rauwolfia, thousands of others have been synthesized for treating the psychopathology associated with schizophrenia, depression, and manic-depressive psychosis.

Since its establishment in 1956, the Psychopharmacology Branch has administered most of the research on somatic treatments. A major contribution of this branch has been the development of a model methodology for collecting and evaluating data regarding clinical effectiveness of drugs and for disseminating the findings. As a result, clinical trial rather than clinical impression is now accepted as prerequisite for the wide application of therapeutic drugs. NIMH joined with the Veterans Administration (VA) to launch a major multihospital collaborative study that contributed to the demonstration that chlorpromazine and other phenothiazines are effective in the treatment of schizophrenia. Recently the Institute and the VA have undertaken a similar study of the effectiveness of lithium in preventing the acute manic phase of manic-depressive psychosis. Under NIMH sponsorship, a nationwide network of Early Clinical Drug Evaluation Units has been established to search for new drug treatments.

Other Somatic Therapies. Findings on somatic treatment other than drugs are summarized below.

- Electroconvulsive therapy is the most effective and most rapid-acting treatment for the relief of symptoms of the depressed stages of manic-depressive psychoses and involutional melancholia.
- Electroconvulsive therapy has doubtful usefulness in treating character disorders, psychoneuroses, and schizophrenia in the absence of severe superimposed depressions.
- Research on megavitamin or orthomolecular therapy has consistently failed to support the claims of its advocates. Reports of the effectiveness of this treatment appear to be based on studies that are scientifically inadequate.
- Acupuncture was reported in one Russian study to be useful in treating some mental disorders, and the Chinese report its use in conjunction with drugs of the chlorpromazine family and "heart-to-heart talks." Careful study to uncover the underlying mechanisms of acupuncture is warranted, if for no other reason than to inform and protect the public.
- Bioenergetics, structural integration, and related systems are based on the belief that systematic work on the body through such means as exercises, postures, manipulation, and massage has psychological benefits. The body therapies are increasingly popular. NIMH should initiate careful research on them.
- Psychosurgery—the removal or destruction of brain tissue in the absence of apparent organic pathology for purposes of altering thought,

mood, and behavior—has raised serious ethical problems. Although NIMH has supported research on the study of brain function and behavior, such studies involved neurosurgery rather than psychosurgery. The Institute's current interest in psychosurgery lies in determining the extent of use of psychosurgical procedures, identifying former patients, and assessing the short- and long-term effects of the operations. Regulations and standards covering the use of psychosurgery with potential patients are undergoing careful review.

Expenditures on Somatic Therapy Research. Between 1968 and 1973, NIMH support of clinical and preclinical research on pharmacological therapy totaled $59.6 million. Of this, clinical studies—those dealing solely with pharmacological treatment—amounted to $30.1 million. During the same period, about $2.6 million supported research on megavitamin treatment and $291,000 on convulsive therapy.

Minority and Low Socioeconomic Class Patients

When patients come from minority groups or low socioeconomic classes, the difficulty of determining the appropriateness and efficacy of treatment is particularly great. Prejudice and difficulties in communication play a role; so, often, do poverty, malnutrition, and unemployment. In poor communities, the first identification of deviant behavior is frequently made by the police. Symptoms are sometimes called neurotic in whites and psychotic or psychopathic in blacks. For years, blacks were thought to have a low rate of depression, and depressed behavior was likely to be diagnosed as schizophrenic; recently it was found that blacks seemed particularly vulnerable to depression. Third-generation white patients are accepted for psychotherapy significantly more often than people of the same socioeconomic class who are blacks or Mexican-Americans.

In spite of some research indicating the value of psychotherapy with lower class outpatients, basic questions remain—about the best kind of treatment for members of particular ethnic or socioeconomic groups and about the best way to persuade them to come for treatment and remain in treatment.

Recommendations for Research on Treatment

1. The Institute should place primary emphasis on research concerning the treatment and prevention of mental disorders.

There is a widespread belief that all problems producing dysphoria, unhappiness, and "maladjustive behavior" are mental health problems. Three groups of problems have been thus categorized: (a) classical mental illness—mental disorders and problems of adjustment as psychiatrically defined; (b) social problems—those that seem to be predominantly induced and maintained by environmental conditions and that affect particularly such vulnerable groups as the poor, black, young, and aged; (c) problems of self-actualization and fuller use of potential.

All Federal agencies share a general aim: the improvement of well-being, quality of life, and happiness of the people. The Institute's distinctive role is to treat and prevent serious mental disorders.

2. The Institute should give high priority both to developing measures of the effectiveness of all therapies and to followup studies gauging

their long-range effectiveness. NIMH should, for example, undertake or support efforts to: (a) increase the comparability of data from research through the use of standardized instruments and report forms; (b) determine whether different therapies, interventions, and conditions produce different kinds or amounts of change in comparable patients, or produce the same changes more quickly, or with greater durability, or with fewer noxious effects; (c) determine whether specific forms of therapy are uniquely suited for certain patients rather than others for reasons that may be associated with their culutral or socioeconomic group; (d) identify those patients who are helped by a given type of treatment and those who are harmed; (e) determine if there are categories of patients that do not respond to existing forms of treatment, and, if so, attempt to develop appropriate new forms.

3. The Institute should continue to support the development and testing of various therapeutic techniques—including the newer ones—with emphasis on increasing effectiveness and decreasing harmful side-effects. Among the many needs, for example, are: (a) investigations looking to the extension of the behavioral therapist's role through the training of parents, teachers, and peers and through the development of self-control measures to reinforce appropriate behavior in the absence of the therapist, and (b) increased attention to means of preventing and reducing the incidence of serious side-effects of drugs for mental disorders.

4. The Institute should increase its emphasis on, and give high priority to, the total rehabilitation process—as it takes place inside and outside of institutions, as it evolves over time, and as it may be affected by short-term interventions. Without adequate community followup programs, many patients are unable to sustain themselves. Moreover, the lack of adequate community care programs encourages the use of psychoactive agents for prolonged and indefinite periods without supervision—a practice that appears to increase the likelihood of dangerous side-effects.

5. NIMH should increase research on the effects of using psychoactive drugs and psychotherapy in combination.

6. NIMH should increase research on the early detection of emotional problems, particularly in children, and on the efficacy of various modes of intervention.

Organizational Recommendations

1. The Institute should establish a center for research on psychosocial treatments, including behavior therapy. This center would: (a) coordinate, analyze, and evaluate current research on treatments supported and conducted by NIMH; (b) support the development of instruments and methodology to facilitate such research; (c) prepare and disseminate information on research efforts and results; and (d) stimulate, support, and conduct research on new psychosocial treatment approaches aimed at nonpsychotic mental disorders.

2. The Institute should combine its existing clinical facilities—at St. Elizabeths (in Washington) and Bethesda—into one facility devoted to multidisciplinary research programs in the major mental disorders, addiction, childhood psychosis, violence, and neurological problems.

Research on the Need for Treatment and Other Mental Health Services

Improvements in the delivery of services to the mentally ill depend on three types of research other than research on the nature and causes of mental illness and on methods of treatment. These types are: (1) studies to tell us where mental health services are most needed, for how many people suffering what types of illness, and at what cost services can be delivered; (2) studies of what appear to be better ways of delivering the services; and (3) studies of the effectiveness and efficiency of ways of delivering services.

Biometric and Epidemiologic Studies

Data on people receiving mental health services in mental hospitals, general hospitals, outpatient clinics, and community mental health centers are provided by a national reporting program, established as the result of action taken by NIMH in 1951.

This information is essential for gauging in a general way and at national and State levels the need for and the effectiveness of mental health services. For example, the reporting program has documented the dramatic decline in State mental hospital populations over the last two decades. In 1955 the rate of patient care episodes in these hospitals was 505 per 100,000 people; by 1971 it had fallen to 363. Between these years the proportion of people receiving mental health care in State hospitals dropped from one-half of all the people cared for by psychiatric facilities to one-fifth. By 1971, 8 years after the passage of the Community Mental Health Centers Act, the federally funded centers had a higher number of patient care episodes than the State hospitals.

The Institute has taken and is currently taking many other initiatives to throw more light on the needs, costs, and results of mental health services. For example, it is helping States identify areas with populations having a greater than usual susceptibility to mental disorders. And it has sponsored the development of psychiatric case registers, which make it possible to follow the progress of patients through the various parts of the mental health care system and to obtain estimates of the costs.

Such efforts and the national reporting programs are under the immediate direction of the Institute's Biometry Branch. Since 1967 the Institute has also had a Center for Epidemiologic Studies, which supports: (1) two small field stations, which are investigating the extent and possible causes of depression, and (2) a number of investigator-initiated studies concerned with such subjects as the extent and causes of psychiatric impairment among children, the effects of social change on family health, the prevalence of psychiatric distress among university students, the relationship between social class and mental illness, and the development of instruments to measure psychological well-being.

Unmet Needs for Data

The Institute's biometric activities, which are internationally admired, have very greatly strengthened the Nation's ability to plan and evaluate the delivery of mental health services. Nevertheless, there are serious unmet needs. The following are particularly important:

1. *Facts on the frequency of occurrence of mental disorders in the general population.* The available information is largely restricted to people who have been treated at a psychiatric facility. However, many people are not treated there, and many others are not treated at all. Surveys made over the last three decades show, at one extreme, 8 persons per 1,000 known to be under psychiatric care and, at the other extreme, 240 persons seriously impaired out of every 1,000 persons (aged 20–59 years) not in institutions. Practical and reliable case-finding techniques do not exist.

2. *Facts on what happens to people who have received mental health services.* What changes occur? How do these people adjust socially and occupationally? Do different types of mental health care have different effects on the lives of people after treatment? To what extent do community programs increase or decrease the burden of mental illness on patients' families and the community?

3. *Circumstances influencing the use of mental health services.* What are the socioeconomic, attitudinal, and other factors that either facilitate or block access to mental health services?

Major Recommendations for Studies in Biometry and Epidemiology

The Institute should use every means at its command to obtain: (1) reliable data on the incidence and prevalence of mental disorders among the general public, and (2) more nearly accurate ways of measuring the need for and effectiveness of specific mental health services in a given population. Among the actions required is the establishment of several field units for epidemiologic, biometric, and evaluative research.

Organizational Recommendation

The Institute should seriously consider merging the units concerned with biometry and epidemiology.

Research on the Delivery of Mental Health Services

Research to improve the delivery of mental health services has been supported by the Institute since its beginning and has been an identifiable and important program since the passage of the Amendments to the National Mental Health Act in 1956. Title V of that Act authorized funds to support studies, experiments, and demonstrations intended to improve services to mentally ill people and to foster mental health.

Since then, major contributions have been made through extramural projects dealing with consultation and education techniques, crisis intervention, partial hospitalization, intensive treatment, community alternatives to isolated hospitalization, systems of organizing community agencies, third-party payments, uses of mental health manpower, specialized services for children and for the chronically ill, and other subjects. NIMH-sponsored research developed and tested virtually all the concepts later applied in the community mental health center program.

A survey of 5 sample years since the start of the Institute shows that no more than half of the extramural projects listed as mental health services research were actually research to produce new knowledge.

Roughly a quarter of the projects were demonstrations; another quarter dealt with service evaluations and with training, usually of paraprofessionals.

The extramural program of services research is administered by the Mental Health Services Development Branch. Such research is also conducted by an intramural unit, the Mental Health Study Center, which is located in a Washington suburb and began life in 1948 as the Prince George's County Mental Health Clinic. The center has done extensive research on meeting community mental health needs, developing services for children, identifying children likely to be failures in school, helping troubled adolescents and their families, preventing runaways, and planning for citizen-agency collaboration.

An Evaluation of Services Research

One of the biggest problems faced by the extramural program on services research has been to get research findings reported, disseminated, and applied. Progress toward solving this problem has been substantial.

For the decade ending in 1965, the proportion of investigators submitting final reports to the Institute was 40 percent. By 1970 it had risen to 95 percent.

The proportion of investigators initiating at least two disseminations of research results increased from 45 percent in 1967 to 75 percent in 1970. During the same period, the proportion of investigators who could report use of their results beyond the site of their research rose from 19 to 50 percent.

Those improvements followed the institution of: (1) monitoring programs, including the use of a checklist of factors that had been found to differentiate high payoff from low payoff projects, and (2) efforts to foster the dissemination and use of results.

In principle, extramural research on services is now operated as a research and development program, meaning that service problems are assessed; existing information is searched for a solution; research is stimulated when necessary; and use of the findings is encouraged. Actually, most grant applications still come spontaneously from the field. Significant progress has been made, however, toward putting the principle fully into practice.

Staff of the Mental Health Services Development Branch have pointed to a number of deficiencies in the organization and management of services research. These include the following:

- The research follows rather than anticipates crises.
- Applications for grants, on the whole, have been poor. For example, investigators often fail to consider the factors that help determine the extent to which the project findings will be applied. Staff collaboration can help remedy the weaknesses now prevalent in grant applications, but requires a great deal of time. Collaboration is often not warranted because of the small probability that a project going through the traditional grants review system will be funded.
- The services research program has had little contact with the Institute's biometry and epidemiology programs, or with the service programs of the centers within the Division of Special Mental Health Programs.

Substantively, the greatest deficiency is probably lack of adequate methodology for field research on services. This deficiency is likely to be reduced by the large NIMH investment in the development of program evaluation methods, notably measurements of goal attainment. Another grave deficiency is the general lack of adequate information on the incidence and prevalence of mental disorders, a lack that hampers the planning of services and the analysis of their effects.

Authorities outside the Institute have suggested that the most serious deficiency over the long run may be the inability to describe the mental health delivery system as it is now and as it should be a decade, or two decades, from now. Knowledge of where we are now—including in some detail who gets what kind of service, for what kind of disorder, with what results, and at what cost—and a description of where we should like to be some years from now would facilitate the planning of research and other efforts to improve services. Action can be taken most effectively when the discrepancies between what the country has and what it should have are made clear.

Services Evaluation Under Congressional Mandate

Congress has stipulated that federally funded health programs must be evaluated and that 1 percent of the money appropriated for those health programs may be set aside for the evaluation studies. During the period 1971 through 1973, NIMH awarded evaluation contracts totaling about $2 million a year, using that 1 percent money. Most of the funds went to studies of services. This program, directed by the Evaluation Branch, is only a part of the Institute's evaluation activities, since all major divisions are responsible for making assessments in their areas. NIMH is now reassessing the results of past evaluation studies and determining their impact on program policy and planning. The aim is to encourage NIMH managers to routinely consider the results of evaluation when making decisions.

Of the 73 contracts financed by evaluation set-aside funds, 29 have dealt specifically with the community mental health centers program. Analysis of the first 20 of these to be completed leads to the following findings, among others: (a) the centers' impact on the use of State hospitals is still not clear, and (b) centers typically underserve elderly people because these people usually do not define their problems as problems of mental health, are often unable to travel to a place for services, and often find costs a barrier.

If evaluation is to be viewed as part of the planning and management systems, utilizations of results must be considered. Unfortunately, recommendations resulting from evaluation studies are rarely put into effect at the local level. The major reason lies in regional and State evaluation systems that are insufficiently prepared to give technical assistance to centers needing it.

One big roadblock to fully successful evaluation activities by the Institute is the exclusive reliance on grant and contract mechanisms, both of which—particularly the former—are unwieldy and slow.

Recommendations for Research on Mental Health Services

For more effective operation of the services research program, the Institute clearly needs a research and development system under which such research—instead of being guided almost entirely by proposals from the field—would be planned and directed by the Institute itself. To attain such a system, the following actions are proposed:

1. A Coordinating Panel for Mental Health Services Research, appointed by the Director, should develop a pilot program of targeted studies. Each project should be so designed that its findings would advance other research in the area or be directly and widely applicable to service delivery. By the end of a 3-year trial period, these projects should comprise 20 percent of the Institute's total budget for mental health services research. To help finance the program, NIMH each year should convert $500,000 in unobligated grant funds to contract funds. And it should draw upon the 1 percent evaluation funds to assess and adjust the program.

2. To make extramural services research more responsive to Institute needs, NIMH should: (a) stimulate grant applications in priority areas; (b) establish a special review group to consider new applications; and (c) offer Institute assistance to improve the quality of both the research design and the grant application.

3. In addition to the proposed coordinating panel, the Institute should take whatever means are necessary to establish strong coordination among all units concerned with services research.

4. The Institute should support research in three areas of equal importance: (a) processes essential to the delivery of services, with the first priority going to ways of ensuring the financing of mental health services; the second priority, to ways of ensuring quality care; the third, to ways of improving the planning and evaluating of services programs; (b) means of ensuring equity of access to mental health services and equity of services, with priority going to studies on the groups in greatest need of services; (c) technological developments, with priority going to methods for transferring research results from the researcher to the potential user.

5. Periodically, the Institute should provide a description of the Nation's mental health services delivery system in sufficient detail for the system and its components to be evaluated and action planned to further the achievement of NIMH goals. The description should include the kinds of services being provided, by whom and to whom and under what circumstances, and the costs and results.

6. Because the principal roadblock to successful evaluation activities is exclusive reliance on grants and contracts, the Institute should develop an inhouse capability to conduct evaluation studies.

7. The Institute should make every possible effort—including the development of inhouse training programs—to increase the number of trained personnel in order to carry out the recommended research activities.

Fostering Dissemination and Use of Research Results

The value of mental health research depends not only on the quality of the investigation and the nature of the results but also, and in the

main, on the extent to which the results reach and are put to work by the people who can use them.

Scientists employed or supported by the Institute have always been encouraged to publish their work in scientific journals. But such publication does not make research information readily available to many potential users, including mental health practitioners, research managers, policy-makers, agency administrators, and the general public. To reach these other potential users—people who are not fellow scientists of the reporting investigators—the Institute has established numerous channels for promoting dissemination and use of research information. Almost all such activities have been undertaken within the last dozen years, under the pressure of rapidly accumulating information about mental illness and health and of growing congressional and public interest in NIMH achievements. The National Clearinghouse for Mental Health Information was established in 1962; the Office of Communications, 1967; and an automated Institute-wide source of information on research projects and programs in 1973. In addition, the Mental Health Services Development Branch, as noted in the preceding section, has long promoted the application of findings from research on services delivery.

A number of other NIMH components have at least a major interest in fostering the diffusion and use of research information. The Psychopharmacology Research Branch operates a computerized information network through which investigators making early clinical trials of psychoactive drugs report their results and have them analyzed, and can retrieve the findings of any similar research in which they are interested. The Center for Studies of Schizophrenia publishes the *Schizophrenia Bulletin*, which carries new and comprehensive information about that disorder. The Center for Studies of Crime and Delinquency finances the efforts of investigators, when they have made significant findings, to reach potential users through special publications, workshops, and consultations; the center consults directly with regional, State, and local agencies. The Program Analysis and Reports Branch prepares information on research findings to meet administrative needs, to answer requests from other Federal agencies and from Congress, and to inform the public. These and a number of other NIMH units have published books and brochures containing research-derived information on virtually every aspect of mental illness and health; have initiated periodicals to help special audiences and the public to keep abreast of research developments; have developed bibliographies and technical manuals for researchers and users of research information; have used videotape and film for educational purposes; and have conducted or supported numerous conferences and workshops.

Since no item for such activities appears in NIMH operating budgets or in research grant applications, it is impossible to obtain accurate information on their costs. By rough estimates, the total costs in a recent year came to at least $20 million.

Evaluation of the Effort

Activities to further the diffusion and use of research findings have led to substantial accomplishments, mainly because of individual initiative.

Such efforts are not coordinated, and, in the absence of Institute-wide policy to guide them, they tend to be undertaken mainly in response to outside pressures. The efforts have other shortcomings. For instance, the processing of publications is hampered by red tape; research project files are inadequately maintained; the Institute's regional offices are involved only slightly in research information activities, even though these offices have become increasingly important. Moreover, the new automated system for storing and retrieving substantive and financial information about NIMH operations does not permit the efficient assessment of research programs. The Institute has been primarily concerned with producing research information, to the neglect of an equally important activity, facilitating its dissemination and use.

Recommendations for Promoting Diffusion and Use of Research Results

1. To counteract the generally laissez-faire attitude of staff members toward efforts to disseminate and advance the use of research information, the Director should: (1) issue an explicit mandate stating that such efforts are an integral part of the Institute's research enterprise, and (2) attach a staff group to the Office of the Director, with representatives from each office and division, to serve as an advocate for these efforts. This group should be charged with developing a system to coordinate, not control, the many independent NIMH activities in this area. Among other capabilities, the system should be able to monitor and evaluate these activities and to devise effective strategies for particular situations.

2. The Institute should: (a) support syntheses, state-of-the-art studies, and other efforts to consolidate knowledge; (b) establish computerized data resources, in accordance with guidelines set forth in Chapter 14 of the report, that are based on past information-storage programs and on the experience of the Task Force; (c) increase support of research on the most effective means of presenting research information to a variety of audiences and of overcoming resistances to utilizing research findings; (d) increase support of conferences and other meetings, particularly those designed to foster the use of research information, but decrease support for the publication of conference proceedings; (e) make more use of seminars for informing mass media of research findings; prepare more exhibits based on research information and display them at more conventions and meetings; increase the use of audiovisual means for disseminating research information to scientists and mental health practitioners as well as to the general public.

3. The Institute should make every effort to ensure that the information it gathers is accurate and timely and as comprehensive as required. It should emphasize quality and not quantity.

Research Policy, Organization, and Administration

In addition to evaluating research accomplishments and recommending substantive emphases, the Task Force was charged with recommending organizational and managerial changes that might be necessary to strengthen research activities. In this area, as in all others, its work was to be directed to the advancement of the Institute's mission. Fulfilling this responsibility presented unexpected difficulties because the mission, as de-

rived from the National Mental Health Act of 1946 and later legislation, has an umbrella-like quality. The mission is simply *the improvement of the mental health of the people of the United States;* it offers a world of room for the support of research.

Existing Research Policy and Need for Change

Research policy for carrying out that mission was influenced from the start by the decision to place the new agency with the National Institutes of Health rather than with the Bureau of State Services. This decision established research as the agency's primary task and aligned NIMH with the fundamental policy of the existing Institutes—to maximize the freedom of all the investigators supported. The policy was further shaped by discussions among the new Institute's first director, the National Advisory Mental Health Council, and other leaders in the conduct and support of research.

The resulting policy, though never specifically formulated, was simply to support the best possible research having demonstrable or plausible relevance to mental health problems. The first Council later considered the advisability of setting research priorities but refrained on the grounds that not enough was known to warrant such direction.

In a research field as complex and underdeveloped as mental health, this policy was both appropriate and necessary. Two decades ago, relatively few scientists were devoting their efforts to mental health research, and the implicit policy guiding the Institute was well understood by the small staff surrounding the Director. Research programs advanced in quality and scope without need for a more clearly articulated policy. Over the years, however, the environment gradually changed. Today, hundreds of scientists in many different disciplines are seeking solutions to the Nation's incredibly diverse mental health problems. They are using research techniques and strategies greatly increased both in number and quality, and they are working from a knowledge base that seems to be approaching a critical mass. As this report attests, significant progress has been made; even more striking advances lie ahead.

Nevertheless, the American research community faces difficult issues. These include problems related to the accountability of scientists, to the use of scientific approaches to practical problems, and to disappointment on the part of many people with the fruits of science and technology. Other problems arise from marked changes in the contemporary scene, such as depletion of natural resources, shifts in ethical and moral values, and the rising consciousness of attitudes and actions affecting minority groups.

Finally, financial resources have diminished in mental health and many other research areas—a development that even by itself would require a careful review of policy. Not all worthwhile mental health research can be supported, now or in the future. Difficult choices will be forced, and a clearly voiced policy to guide decisionmaking becomes essential. Difficult choices would have to be made, too, if resources were to be suddenly increased.

After many discussions that took into account these and other developments, the Task Force formulated the following guidelines for NIMH research policy.

Guidelines for an Explicit Research Policy

- A research policy for NIMH should explicitly acknowledge that research to carry out the Institute's mission must be comprehensive—ranging from studies at the molecular level to analyses of whole societies. The policy should make clear that all mental health research approaches—biological, psychological, sociocultural—are interrelated and that the Institute must continue to support all of them.
- Flexibility must be maintained. The individual scientist must be free to pursue new paths as new knowledge emerges, and the Institute must be able to make changes readily in its research support programs and procedures.
- NIMH should make decisions about research on an inductive basis. Generalizations to guide the research program are better achieved by moving from the particular to the general than by attempting general formulas.
- Just as individual scientists set the day-to-day priorities for their research, NIMH research management should continuously analyze program distribution and decide on specific priorities appropriate to given circumstances. Emphasis on adaptability and rational selection of choices as circumstances change will provide a research program that is truly accountable to the larger society.
- In planning support of research, NIMH should treat basic and applied research separately. This is because: (1) effective intervention in many mental health problems depends on knowledge we do not yet have, and this knowledge is likely to be acquired mainly through basic research; (2) owing to the very nature of basic research—in which, characteristically, new knowledge emerges from unsuspected directions and in unplanned ways—funds for it cannot be distributed according to problem areas as defined by society or even according to research goals; (3) applied research can be more closely planned, managed, balanced, and evaluated. Basic research should be allotted a substantial and stable proportion of the entire research budget, and the sole criteria for supporting it should be scientific excellence, timeliness, and potential relevance to mental health, as these are interpreted in the peer review system. It should go without saying that in order to develop more effective means of treating and preventing mental disorders, a variety of applied research undertakings are also needed.
- Critical for the support of any research is scientific excellence, a standard necessarily excluding research that is trivial, faulty, or unproductive.
- Scientists and research managers should play a decisive role in planning the Institute's research program and in setting priorities.
- Institute management should more strongly advocate NIMH research activity as the foundation supporting all other NIMH activities, and the Director of the Institute should take a more active role in setting and implementing its research policies.

Findings on Program Planning, Balance, and Priorities

These terms refer to the processes by which Institute resources are allocated among research programs and objectives. The allocation involves a process of negotiation and adjustment, with the previous year's budget

as the point of departure. Until recent years, support both for new programs and the expansion of existing ones could be provided—without seriously decreasing support elsewhere—because of the annual increment of research funds. Under the more rigorous fiscal conditions of today, however, support for a given research activity can usually be maintained at existing levels only by cutting back support for other activities. Decisions in program planning, therefore, require priorities.

Individual study groups have made numerous recommendations worth special attention; the major ones have been noted in preceding sections. These recommendations, although important in themselves, are not concerned with the problem of overall balance. Moreover, the study groups found it extremely difficult and sometimes impossible to state priorities even for the areas they addressed.

After many months of careful study, the Research Task Force concluded that it would be unwise to attempt to set specific priorities—to say, for example, that research on one type of mental illness has a higher priority than research on another type. Setting priorities of these kinds could be detrimental to the research program, because, once established, they become self-perpetuating. NIMH should handle the problem of priorities by flexible and continuous review of planning. The review should be undertaken both by the Institute's research managers and research scientists and, through the peer review system, by mental health scientists throughout the country.

There is a need for setting priorities, but it is political and not scientific. The Director will have to meet it, as in the past, on the basis of the extent and severity of given problems and on the amount and quality of concern being expressed by Congress and the American people.

NIMH Use of Evaluation Procedures

The Institute employs evaluation procedures for a number of different purposes, summarized below.

Scientific Evaluation. Responsibility for evaluating the scientific quality of extramural research projects rests with the peer review system. As described earlier, this consists essentially of committees of scientists and science administrators—one committee for each major research field—to review proposals both for research support and for renewals of this support. Suggestions and recommendations pertaining to this system include:

- Sole reliance on the peer review system, whose criterion is scientific excellence, is appropriate in the basic research areas. In targeted research, scientific merit is a necessary but not sufficient criterion; hence, active participation and direction by NIMH management is essential.
- The peer review process should be applied to all contract research.
- Immediate steps should be taken to develop such a process for use in the intramural research program.
- More extensive use should be made of experts other than those on review committees, both for suggesting nominees to replace departing committee members and for advising on research.
- When population groups are to be studied under proposed research, representatives from those populations should take part in considering the social or technological impact of the study and possible ethical issues. This

aspect of the review process should be clearly distinguished from the review for scientific merit.

Evaluation of the Review Process. Rigorous examination of the peer review system has failed to substantiate criticisms that have been made of it. Task Force participants have offered two suggestions intended to enhance the committees' effectiveness. One of these, reported in the section immediately above, calls for bringing in outside experts more frequently to advise on the appointment of new members; the other recommends that the Inter-Divisional Research Council, proposed in a later section, should advise the Director regarding the Institute's review committee structure. The Task Force also recommends that the review committees continue to be attached to the research programs, where the responsibility for evaluating them can be shared by the committees' executive secretaries, committee management personnel, and scientific program staff.

Evaluation of Grantee Responsibility and Productivity. Such evaluation is a responsibility of program staff, review committees, and the Grants and Contracts Management Branch. A system for reviewing the final progress reports of extramural projects is being established. No additional mechanism seems necessary.

Evaluation of Program Goals. In many respects this is the most important type of evaluation, for all research activities should be describable in terms of their progress toward stated goals. It is also the most difficult type because it must take into account such matters as research policy, individual program philosophy, and the balance between targeted and nontargeted research, as well as occasional demands placed upon the program from above. Except through the Research Task Force, the Institute has given very little attention to such evaluation. Indeed, the Task Force, in trying to evaluate goals, has found itself hampered by the lack of a clear, explicit research policy. In retrospect, any new programs or new demands on existing programs seem to have arisen in response to public or administrative pressure rather than developments in science. Such pressure, which can be expected to continue, further complicates the evaluation process.

Evaluation for Scientific Guidance. This usually takes the form of scientific conferences, which may or may not be supported by NIMH, to assess the state-of-the-art in a given area, to identify gaps in knowledge, and to consider conceptual, methodological, and other research problems. NIMH should continue to support such conferences when they show considerable promise for scientific advancement.

Evaluation for Administrative Guidance. Research programs must be responsive to developments in their scientific fields. The peer review process helps to guarantee such responsiveness except in those programs, frequently seen in the targeted areas, that combine elements of several disciplines. In such cases, counsel about the best way to balance the research in order to achieve program goals can often best be obtained through interdisciplinary conferences and workshops. The Institute should continue to support such meetings, always balancing the need for integration and synthesis against the need for additional knowledge.

Need for a Comprehensive Data Retrieval System. Many of the difficulties faced by NIMH in attempting to evaluate its research programs stem from the lack of readily available information about the scientific

and administrative aspects of all grants and contracts. A comprehensive system of research information retrieval—the requirements for which are discussed in Chapter 14 of the report—would not only facilitate evaluation activities but also advance a major NIMH aim: to transfer knowledge generated by research to those who can use it.

Recommendations for Organization and Administration

A number of Task Force participants have characterized the Institute's organizational structure for research—described in Chapter 2—as unnecessarily diffuse and in other ways less effective than it could be, and all the study groups have recommended changes that the members believed would improve the effectiveness of research support in each group's own domain.

These recommendations have been noted in the preceding sections of this summary. As grouped in Chapter 16 of the report, they include a dozen proposals for new organizational entities, half a dozen for better coordination of existing units, and several for increased substantive integration—through interdisciplinary studies, through syntheses of existing information, and through integrative, theoretical writing.

Inter-Divisional Research Council. In general, the Task Force has not passed judgment on the recommendations of individual study groups. A major exception is the proposal, advanced by several groups, that the Director appoint a high-level advisory council to provide scientific and managerial advice concerning the Institute's research enterprise as a whole. After intensive discussion, the Task Force concluded that this purpose and the interests of NIMH research activity could best be served by a body comprising the Institute's research managers. It recommended, therefore, that the Director establish an Inter-Divisional Research Council representing the leadership of all NIMH research components and the Assembly of Scientists; it would be served by an executive secretariat. The Council is intended to create greater coherence among the Institute's diverse research activities and to gain a greater share of management concern for the research effort.

The Role of Scientists in Administration

In order to give the Assembly of Scientists an official role in the Task Force, the Director, NIMH, specified that the membership of the Coordinating Committee include an Assembly representative. The Assembly took an active role in the Task Force throughout. One of its major efforts was the preparation of a position paper recommending an enlarged and more effective role for scientists in the administration of NIMH research.

The Assembly recommended a number of concrete proposals, of which the principal ones follow:

1. A modified peer review system should be regularly and systematically employed in the intramural research program as a primary basis for evaluating the scientific accomplishments and potential of individual scientists and research programs. This evaluation would provide the administration with a valuable adjunct to, but not a substitute for, administrative judgment in allocating program support and in judging scientists for career advancement.

2. Selection of responsible program officials in NIMH is among the most consequential decisions for maintaining the excellence of its scientific programs. NIMH scientists have been underutilized in such selection procedures, even though they can bring to them an unmatched degree of substantive expertise and first-hand personal and professional familiarity with candidates. Formal selection committees, with representation of the scientists, should be used in selecting candidates for any positions in NIMH that involve research program leadership.

3. NIMH should explicitly guarantee basic minimum research support for its senior independent investigators. Administrators would still retain ample discretion in deciding which scientists should be more liberally supported above this minimum. At the price of *some* limitation of administrative flexibility, the Institute can thus provide its scientists with the freedom and security that the best scientists require in order to work productively.

Recapitulation: Common Themes in the Report of the Research Task Force

Emerging from the analyses by the 10 study groups of the Research Task Force and from the report based on these analyses are not only findings and recommendations concerning particular research activities but also themes and problems common to several, sometimes all, of the research areas supported by the Institute.

One general theme is *accomplishment;* another, *unfinished business.* The major advances and the major unsolved problems are set forth in the preceding sections, dealing with specific research areas. So are the major recommendations for further research in these areas. This concluding section calls attention to important commonalities in both the problems and the proposals for meeting them.

1. *Pervasive Substantive Needs*

   a. *Better information on the extent of mental illness and the results of treatment.* Excellent data exist on the number of people served by institutions—hospitals, clinics, community mental health centers—that treat mental disorders, but there is little information on the number of people who need treatment or the number who are receiving it from private therapists. Little, if any, data exist on the demographic and socioeconomic characteristics of the people treated, the types of treatment used, and the results. Such information would vastly increase both our ability to meet, most efficiently, the Nation's need for mental health services and our understanding of the nature, causes, treatment, and possible prevention of mental disorders.

   The Institute should use every means at its command to obtain: (a) reliable data on the incidence and prevalence of mental disorders among the general public, and (b) more nearly accurate ways of measuring the need for and the effectiveness of specific mental health services in a given population.

   b. *Clarification of hereditary influences.* Studies of identical twins and of adopted children demonstrate the presence of a genetic factor in many—though by no means most—cases of schizo-

phrenia, depressive psychosis, and alcoholism. One of the Institute's highest research priorities should go to studies seeking to determine: (1) the nature of the biological mechanisms through which the genetic factor is expressed; (2) the reasons it may lie unexpressed; and (3) the possible role of heredity in other mental disorders.

c. *More information on preventive factors.* Even in environments where the rates of mental illness and other social problems are unusually high, most young people do not become mental patients, addicts, or criminals; in fact, some have lives rich in achievement. Why?

d. *Sound information on how biological, psychological, and sociocultural factors interact to affect mental health.*

2. *Pervasive Needs in the Interest of Continued Research Progress*

a. *Improved methodologies.* Most of the advances in mental health research during the last 25 years were made possible by advances in research techniques of all kinds. Further knowledge rests to a great degree upon still further methodological improvements. Particularly important are improved and standardized diagnostic techniques; these are essential for virtually every type of mental or emotional disorder.

b. *More longitudinal studies.* Particularly needed are long-term studies to determine those factors disposing to, and those protecting against, mental disorders, delinquency, and abuse of alcohol and other drugs among the children and youth of groups most vulnerable to these conditions.

c. *More stimulation of research.* In its research grants program, NIMH not only should continue to respond to ideas from the field but should also, to a greater extent than in the past, stimulate research in areas where it appears to be needed. Without such stimulation from the Institute, some findings may be neither verified nor built upon, and research possibilities may wait longer than necessary for exploration.

d. *Continuation of excellence as the criterion for the support of basic research,* with excellence implying relevance as well.

e. *More evaluative studies, more scientifically conducted.* Such studies are needed particularly to determine the value of a specific type of treatment or other service: (a) in comparison with other types, and (b) used with different types of people.

3. *The Need to Broaden the Use of Research Findings*

The greatest single need in this area is an explicit policy on which to base an Institute-wide effort to disseminate research findings, and, whenever appropriate, to foster their use.

4. *The Need for Synthesis and Integration*

There has been a natural tendency to use research funds mainly for the development of new knowledge. Relatively neglected has been the need to bring together and evaluate findings in a given area, consider them in relation to findings from other mental health research areas, and determine the implications for further research and for application. NIMH should recognize that the synthesis and integration of research results may often be as important as the research itself.

5. *The Need for Better Communication and Coordination*

Study group after study group found a need for either: (a) a closer working relationship—to be achieved in a variety of ways—among those NIMH units having common or related research interests; or (b) a central, coordinating research director or council; or (c) both. The Task Force Coordinating Committee called for the establishment of an Inter-Divisional Research Council.

EPILOG

Twenty-five years is less than an eyeblink in human history, yet in this time the National Institute of Mental Health has fostered major developments in mental health research and treatment that raise the expectations of the quality of life for all Americans. Indeed, seen in perspective, the contributions of NIMH may be regarded as an important factor in the social evolution of recent times.

Looking back, it is hard to believe that only 300 years ago, in Europe and Great Britain, stench-filled leprosariums were being transformed into dungeons serving as houses of "correction" for the mentally ill. Victims of emotional disturbances or thought disorders were likely to face chains—for example, in a rat-infested prison such as the Hôpital General in France or in a British correctional facility. The possibility that mental illness need not persist for life began to be acknowledged very slowly, and only toward the end of the nineteenth century did scientific psychiatry begin. With its new concepts came the possibility of medical intervention, of amelioration and perhaps cure, introducing hope for the millions of people who are in some way afflicted.

More recently, in our own time, that hope has begun to be realized, and NIMH has played a critical role in the process. The Institute has had a relatively brief existence, yet it has supported scientific inquiries and applications that now touch a large fraction of the mentally ill people who live on this planet. Today, people all over the world are being affected by the conviction that mental illness, like physical illness, has causes that can be explored, understood, and ultimately corrected. Because a medical model of emotional and behavioral disorders has become increasingly acceptable, it is possible for disturbed people to seek help rather than resign themselves to misery. But it must be emphasized that in some areas, such as alcoholism, we have only in very recent years and only in part moved away from a harsh, corrective approach and toward a therapeutic one.

The Institute is significantly responsible for this quiet revolution in the delivery of mental health services—for responding to affliction not in a punitive but in a therapeutic mode. Its policies and abiding philosophy have strongly influenced the entire mental health profession, and thus the lives of millions of Americans, present and future.

Yet, even as the Institute enters its second quarter-century, the medical model itself becomes inadequate as a universal approach, since it is clear now that a sizeable proportion of the disorders resulting from the stresses of a long-industrialized society do not reflect pathology in the traditional sense. There is special value, therefore, in the exploration, with NIMH support and guidance, of the social stresses that threaten to afflict all Western people. Mental health research can hardly be expected to cure all the problems generated by society, but it can help lay bare the

inner structure of such problems and thus indicate the directions of amelioration and prevention.

In scanning the many accomplishments by NIMH in 25 years, an interesting contrast emerges with the bulk of medical research. Although most major health research programs are targeted around specific pathologies such as cancer or heart disease, a large number of NIMH projects have been focused upon correlates of mental *health* rather than illness. Institute-sponsored research has correctly avoided an emphasis only on pathology, for such an emphasis leads to the misguided impression that health is something left over from the resolved problems of illness rather than the other way around.

Correctly, too, the NIMH investment in research has not been channeled into any one research area, nor has all reliance been placed on one or two specific disciplines. As this report has made clear, the quality of life —of mental health—has been nourished by many kinds of research, from the basic psychobiological studies to wide-ranging social observations and evaluations. The Institute has actively encouraged multidisciplinary programs, and it is the confluence of discoveries from previously unrelated researchers that has led to the burgeoning understanding of behavior and to two decades of notable advances in biological psychiatry. The field of psychopharmacology, for example, owes much of its development to Institute programs, to the coordinated investigations that neurochemists, psychologists, and clinicians have pursued in a creative and productive partnership. Without their work through the 1960's, millions of people suffering symptoms of anxiety and depression would have no effective treatment today.

A specially important role has been played by basic biological and behavioral studies, those not specifically hinged to a particular problem area. Although such basic research offers no guarantees, no specific end-products, this report underscores its crucial role in mental health as the foundation on which all applications must rest. One of the major conclusions to be drawn from the work of the Research Task Force is that prevention or correction of pathological behavior can come only through a thorough, basic understanding of normal processes.

Basic research is forbidding to many nonscientists, and its language and procedures require an intellectual initiation that is not available to everyone. It is difficult even for the scientists to predict when an isolated and seemingly useless finding—as the discovery of serotonin may have seemed in its time—will come to fruition in an unexpected nexus, such as the present attempts to understand basic functions of the nervous system through its response to psychoactive drugs. Because such connections between the findings of science and their application are so important—to the researcher, the clinician, and the layman—this report has underscored the need for continued efforts by NIMH to widely disseminate carefully evaluated information about the outcome of its research programs.

This report also suggests that the availability of skilled mental health manpower in research as well as in service programs is directly attributable to the training programs established by NIMH. Without the Institute's training programs—including, for example, specialized programs

providing postdoctoral fellowships and career development grants for independent work—many lines of research may not have developed.

The quality of research, it is clear, depends upon the availability of first-rate investigators. It has often been observed by researchers that creative scientific leaps take place when there is a "critical mass" of highly trained minds focused on a given area. The productivity of scientists, however, depends ultimately upon a particular kind of environment—precisely the type encouraged by the Institute's intramural research programs and its extramural research policies. The excellence of NIMH research has stemmed from a policy of selecting talented scientists and creating an atmosphere of trust, free of distractions, in an unprogramed environment. Although this approach has been difficult to defend among efficiency experts and cost accountants, the loyalty and creativity of NIMH research staff and NIMH grantees were generated exactly by this freedom.

Had NIMH policy been directed toward tightly controlled and managed research programs, the Institute would not have sustained its high-quality staff. Biomedical and behavioral scientists are not given high status in Government—if judged by laboratory space and salary limits. Many could readily double and triple their incomes in industry, and Government laboratories do often lose their best people in an unequal competition. Yet a number of extraordinarily talented researchers, including Nobel Prize winners, remain at NIMH, a fact that would be puzzling where it not for the particular environment of trust that nurtured their work. The same policies that apply to the Institute's own research projects apply also to those it sponsors. However nebulous these policies may have seemed to some, they nurtured the mental health field into its present being.

Traditional cost-effectiveness methods for evaluating major Government programs are found wanting when applied to mental health research. Improvements in mental outlook, mood, learning ability, or participation in daily life cannot readily be assayed in dollars. Moreover, attempts to evaluate human welfare in the manner, say, of a weapons system, force an inappropriate emphasis on pathology. In reporting reductions of absenteeism, crime, accident rates, or drug abuse, for example, statisticians are likely to phrase outcome in terms only of a lessening of a negative. It is more difficult to place a dollar value on the positive—on information and programs that help foster emotional well-being and self-realization even among those of our citizens who suffer no clearly defined psychopathology. Nevertheless, it must be acknowledged that concern for positive mental health, along with concern for the conquest of mental illness, is at the core of our interests. Internal misery breeds interpersonal and social trouble, and vice versa, in a cruel circle of pain—for the individual and for society.

It is instructive to look back on the last quarter-century and to ask what would have happened had there been no NIMH. Surely, the United States would have had far fewer scientists devoted to urgent mental health concerns. Many of the great universities and colleges in the United States would be without strong laboratories for a range of productive research in the biological, psychological, and social sciences. The number of psychiatrists, psychologists, sociologists, psychopharmacologists, psychobiologists, and other skilled research contributors toward the future

quality of life would be substantially smaller were it not for the Institute's efforts.

Except for the Institute's programs, it is likely that the process of discovery and innovation in the mental health field would have been retarded. The surge of productivity in psychopharmacology, for example, would have lagged, in all probability, if the field had waited only for industrial support.

Moreover, without the close tie fostered by NIMH between research and services, innovative approaches to mental health problems would have been diminished, and community mental health programs would remain a dream—as in fact, for lack of financial support, they do in many communities. Only a small group of affluent people might be receiving therapy, probably heavily weighted toward psychoanalysis and concentrated upon the individual rather than on families or groups, since many of the innovations in therapeutic practice have come from NIMH-trained researchers able to investigate innovative methods.

Only with NIMH support were departments of psychiatry and behavioral science established in all medical schools, and only in this way did an appreciation of the emotional and behavioral factors in every illness become part of the curriculum of all medical students. The impact of the Institute's program has thus gone far beyond the bounds of psychiatry proper to affect every physician's approach to his patients.

The disease categories for which NIMH has the primary responsibility represent perhaps the only major category of illness that, during the first quarter-century of NIMH existence, have shown a significant major change in treatment patterns and in treatment dollar cost. In cancer and heart disease, the incidence, hospital-patient days, and cost have not receded. In contrast, the steady increase in mental hospital population which marked the early years of that period has been sharply reversed, with important savings as a result. This has been a major accomplishment even though new problems have developed in consequence.

The achievements summarized in this report suggest the Institute's impact upon the expectations of future Americans. Anyone whose life has been touched by emotional disturbance, not to mention the more acute and crippling mental problems, knows that mental health is the primary determinant of the quality of the life an individual leads. Many conditions influence our lives, but none so much as our psychological state. Since the mental outlook of a people will be reflected in their behavior, it seems rational for a Government to seek its people's healthy emotional development and well-being. That a Government agency could actually make the progress indicated by this report reflects a step forward in the evolution of human society.

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